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HERBERTIA



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1955

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PLANT LIFE, VOL. 11, NO. 1, JANUARY, 1955

HERBERTIA

1955

Year Book of
The American Amaryllis Society
21st 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

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[THE AMERICAN AMARYLLIS SOCIETY—continued on page 138.]

PREFACE

The 21st issue of *Herbertia*, the yearbook of the American Amaryllis Society, is dedicated to Dr. Robert F. Hoover, who received the 1955 Herbert Medal Award for his outstanding contributions toward the advancement of the amaryllids. Dr. Hoover straightened out the taxonomy and nomenclature of the BRODIAEA LILIES. Prior to the publication of Dr. Hoover's contributions, some of these plants paraded under various names, but now the gardener can rest assured that few if any future name changes will be required. This example shows the value of basic research to the gardener.

Dr. Hoover contributes a charming autobiography, and an article on recent advances in the field of the BRODIAEA LILIES. It is appropriate that the cover design is based on the spectacular FIRE-CRACKER LILY, one of the BRODIAEA LILIES. This can be forced like *Narcissus*, tulips and hyacinths, and all that is needed is some-one to grow a sufficient stock so that all may enjoy this wonderful plant. A word of caution should be inserted here. The native flowering plants, including the FIRE-CRACKER LILY are protected by California law, and growers must therefore grow their stocks from seeds.

Articles on hybrid *Amaryllis* include—evaluation of hybrid *Amaryllis* by Dr. Thornburgh, experiences with *Amaryllis* by Nicholas T. Urhausen, reminiscences by W. E. Rice, more experiences with Dutch *Amaryllis* by John T. Weisner, 27 years with *Amaryllis* in northern Illinois by Mrs. Fred Tebban, and growing *Amaryllis* in California by J. T. Stewart. Prof. Ira S. Nelson reports on an *Amaryllis* collecting trip to South America in 1955.

There are articles on the re-discovery of *Zephyranthes concolor* by Mrs. Morris Clint, the flowering habit of *Ammocharis* by L. S. Hannibal, the cytology of *Tulbaghia violacea* by Drs. Whitaker and Flory, inheritance of seed characters in *Brunsvigia* x *multiflora* hybrids by L. S. Hannibal, multiple scapes in *Hemerocallis* by Dr. Philip G. Corliss, hybridization of *Hymenocallis* by Len Woelfle, the fascinating *Haemanthus* by Armyrn Spies, the incomparable *Lycoris* by Sam W. Sayler. Nerines by Wyndham Hayward, and Crinums in Texas by Lenore Frels, and *Narcissus* breeding by Dr. J. S. Cooley.

There are also articles on *Amaryllis* shows in New Orleans and Mobile, *Amaryllis* school gardens by Mrs. Morton; display of *Brunsvigia* hybrids at the California State Fair, recent daylily introductions by Mr. Saxton, and other subjects. Mr. John F. Cooke, Jr., writes about the use of *Amaryllis* as an educational tool in the Cleveland Public Schools. Lt. Howard contributes charming notes on his visit with plant enthusiasts (part 1); part 2 will appear in 1956.

Mrs. Lydia Barnett, who has efficiently functioned as Membership-Secretary from 1954 to 1955, resigned due to severe illness. The writer is certain that he expresses the consensus of the members in thanking Mrs. Barnett for her excellent work in behalf of the Society, and in wishing for her a speedy recovery. Dr. Thomas W. Whitaker, of La Jolla,

California, an eminent plant scientist, has assumed the duties of Executive Secretary.

During the past year, on doctor's orders, your editor had to leave the Los Angeles basin due to severe sinus trouble caused by air-pollution (smog). He has acquired a home at La Jolla, Calif., on the Pacific Ocean in a smog-free and frost-free area.

The 1956 *HERBERTIA*, the 22nd issue of the yearbook of the AMERICAN AMARYLLIS SOCIETY, will be dedicated to Mr. E. O. Orpet of Santa Barbara, Calif., who effectively introduced the charming hybrid *Brunsvigias* from Australia, particularly the outstanding white forms.

Contributors to the 1956 issue are requested to send in their articles by Aug. 15, 1955 in order to insure publication of this issue in early January 1956. Time of publication depends entirely on the receipt of the articles, and the cooperation of all toward early publication will be greatly appreciated.

March 30, 1955
5804 Camino de la Costa,
La Jolla, Calif.

Hamilton P. Traub
Harold N. Moldenke

DEDICATED TO
ROBERT F. HOOVER, PH.D.



Herbert Medalist—Robert Francis Hoover, *Ph.D.*

Plate 1

ROBERT FRANCIS HOOVER

An autobiography

Perhaps heredity determined that my life work would deal in some way with plant science, although most other people of apparently similar background are in other occupations. My father practices law, but the principal business of both his family and my mother's had been farming. Both my parents are keen lovers of nature and have always encouraged my own tendency in the same direction. Whatever merit my work may possess is largely to their credit, because of their material support during the years of my schooling and, equally important, their constant sympathy with my interests.

I was born at Modesto, California, on August 11, 1913, and grew up in the same locality. Remembrances of early years are vague, but it appears that I soon developed into a "boy botanist." I was much intrigued by a copy of Jepson's "Flora of Western Middle California" which my mother had used in a botany course at Stanford. As far back as memory serves me clearly, probably at about seven years of age, I was familiar with the common wild flowers of the vicinity.

In the 1920's the San Joaquin Valley of California had long since lost its wild aspect of a hundred years or more ago but, even so, was the home of native plants of exceptional interest. Every spring the grain-fields around Modesto offered wonderful opportunities for enjoying the clean air and warm sun in a setting which in retrospect seems beautiful beyond reality. Small depressions floored with impervious clay, where water stood following rains, were filled with the striking blue of a wild lobelia (*Downingia ornatissima*), the rose-red of *Mimulus tricolor*, and creamy meadow foam (*Limnanthes rosea*). Patches of sandy soil were covered with equally colorful flowers of other species. Such scenes have now vanished forever from the vicinity of Modesto, with none to mourn their disappearance. A world made for enjoyment has, it appears, been fraudulently replaced by a world to be exploited, in which the primary aim of everyone is to obtain wealth which fails to bring happiness after it is won. But such are the cynical reflections of an old mossback of forty-one winters!

Along with my appreciation of plants in the wild, there developed a desire to grow them in the garden. When I was about seven, my parents moved to a house on a half-acre lot on the outskirts of Modesto. Here my father planted fruit trees of many delightful varieties, and here I began experimenting with the cultivation of California's unique native plants. Possibly more than any of the rest, those which grow from bulbs or corms had a particular appeal for me, among them the mariposa lilies and the brodiaeas. As a mere child without any formal training in botany, I naturally thought then that all facts regarding these plants had long ago been discovered and published by botanists. I particularly

admired Carl Purdy, who made a business of promoting the cultivation of Californian bulbs, and it was a memorable experience one summer to visit Purdy's ranch in the hills near Ukiah and actually to meet him personally.

By the time I left home to attend Stanford University, I had growing on my parents' property nearly all the native bulbs of the area covered by my limited travels in central California, as well as several other species obtained from Carl Purdy. At that time it was my ambition eventually to have an extensive farm of my own where I could experiment with plants to my heart's content. Supposedly a business similar to Purdy's could provide the financial support for such a project. These, however, were the thoughts of a boy lacking both the talent and the training for success in the highly competitive commercial world. Instinct suggested then, as experience has later confirmed, that operation of a horticultural establishment requires a great deal more than a fondness for growing plants.

The uncertain nature of my vocational aims as late as my college years is indicated by the foregoing remarks. I had no doubt about the work I wanted to do, but the process of growing up brought the realization that I should have to have some sort of employer, whose interests might be very different from mine. Gradually I came to the conclusion that the teaching profession offered the possibility of compromising between my real desires and the necessity of earning a living.

I graduated from Stanford in 1934. Although I was too immature at the time, in experience and in attitude rather than in years, to make the most of my opportunities there, I look back on my time at Stanford as a richly rewarding experience. An outstanding group of faculty members who were willing and able to give personal attention to students contributed much to it, but there was more. Most of my free time was spent in hikes over the hills, where I continued my botanical studies, now made more profitable by a background of classroom instruction. I became aware that the California flora, while being rapidly depleted by the inroads of civilization, still offered a wealth of unsolved problems for study. After 1934 Stanford's botany department ceased to exist as a separate entity, so that I was the last botany major to graduate from there.

Training for employment in some sort of botanical activity required graduate study, while monetary considerations demanded that I transfer my activity to the state university at Berkeley. The writings of W. L. Jepson had long been familiar to me, so it was natural that I should turn to him to supervise my work for the master's degree and then for the doctor's degree. My association with Dr. Jepson did much to develop my scientific attitude and to determine the nature of my interests from that time on. Jepson's death in 1947 was the occasion for the publication of eulogies (some of which qualify as such only in a euphemistic sense) by nearly everyone who had in any degree been acquainted with him. As I was able to restrain myself at the time, perhaps I may be allowed a few words now. Jepson's manner was not such as to encourage close friendship, and not all his personal qualities seemed to me

worthy of imitation, but he rightly encouraged independent thought and self-reliance on the part of his students. My own tendency up to that time had been to accept the statements of recognized authorities uncritically, failing to appreciate the unsatisfactory nature of the evidence for many widely held views. On this account, it is quite possible that no other professor could have contributed so much at that time toward the development of my habits of thought and of work.

At Dr. Jepson's suggestion, I returned to boyhood scenes to write my master's thesis on the subject of the primitive flora of the San Joaquin Valley ("primitive" here being used in the ordinary sense of original). During this time Dr. Jepson was conducting a graduate seminar on the subject of endemism, or the localization of plants in restricted areas. I became so interested that I determined to write my doctor's thesis on some phase of endemism. The area with which I was most familiar had never been studied from that point of view, and I extended my studies to the adjoining and similar Sacramento Valley to prepare a report entitled "Endemism in the Flora of the Great Valley of California." My work for the doctor's degree was completed in 1937, when I was twenty-three years old.

My field trips through the San Joaquin and Sacramento Valleys were my chief source of pleasure during this period. As this portion of California had been largely neglected by plant collectors, it was not remarkable that I was able to contribute to the knowledge of the distribution of many species, rediscover some which had long been regarded as extinct, and even discover a few new species. Among the last are *Cryptantha Hooveri* Johnston, *Euphorbia Hooveri* Wheeler, and *Huegelia Hooveri* Jepson.

Although I had by this time decided that my best opportunity for useful employment was in teaching, there was in 1937 a super-abundance of recent Ph.D.'s in botany, and they were not in great demand as teachers. Dr. Jepson solved the problem by offering to employ me in research until I could find a teaching position. The pay, supplied at times by the University and at times by Dr. Jepson himself, was very low, but pride was satisfied, for at least I was self-supporting! Some of my friends even said they envied me the opportunity. Unquestionably the work was highly interesting, consisting of preparing the manuscript of Jepson's "Flora of California." This work greatly increased my acquaintance with botanical literature and my ability to interpret dried plant specimens. At the same time, I continued my field studies of California plants.

It was during my employment with Dr. Jepson that I decided to review the classification of what was generally regarded at the time as the genus *Brodiaea*. During vacations I had been maintaining my plantings of "bulbs" (corms) at Modesto, and even adding to them. In this way I could compare living plants of the majority of the species. Approaching the problem without prejudice, I finally concluded that the group had been correctly divided into three principal genera many years earlier by E. L. Greene. Working without benefit of cytogenetics or "cytotaxonomy" (whatever that may be), he had reached virtually the

same conclusions with regard to generic limits as those to which independent study led me. My conclusions have been published in detail elsewhere and need not be repeated here.

The brodiaeas (in the old and extensive sense), it may be explained, are fairly closely related to the genus *Allium*. Hence, although they have been traditionally referred to the Liliaceae, Hutchinson's system places them in the Amaryllidaceae. Thus it comes about that the WILLIAM HERBERT MEDAL was awarded for work on a group far less spectacular and less well known than *Amaryllis* and its nearer relatives. I am most grateful to Dr. Traub and the officers of the AMERICAN AMARYLLIS SOCIETY, which is affiliated the AMERICAN PLANT LIFE SOCIETY for giving recognition in this way to my small contribution to the knowledge of the amaryllids.

The brodiaeas all seem small to anyone accustomed to the garden amaryllis, but I have always found them very attractive. One in particular, the FIRECRACKER LILY (*Dichelostemma Ida-maia*), has bright red flowers tipped with green and would be a notable addition to any garden. Most of the other species have flowers in various shades of blue or yellow. Their small size is in one way an advantage, since a number of plants can be crowded into a small space. This has of necessity always been an important consideration to me, and others who do not have a large estate at their disposal might also find brodiaeas suitable. Probably the principal reason for their general neglect by gardeners is simply the custom of planting only the same familiar things one knew in the "old country" or "back east."

While my work on the brodiaeas was in the course of publication, it appeared that the demand for teachers was increasing. In 1941 I found my first full-time job as a teacher, at the Yakima Valley Junior College, Yakima, Washington. I had never been so far away from home and in a way was disappointed not to have permanent employment in California. However, the year in Yakima turned out to be a thoroughly happy and profitable one. The cold of winter was far less uncomfortable than I had supposed it might be, and with the coming of spring the Yakima region burst into bloom with flowers I had never seen before, together with some old acquaintances of wide distribution. My point of view as a student of plant life became greatly broadened. Every Saturday was the occasion of an excursion into the country, where I collected plants furiously. Even though a newcomer to the region, I found some plants which previously had been overlooked. One of them was named for me, *Tauschia Hooveri* Mathias & Constance. The coming of World War II (I instinctively call it *The War*) was the cause of my leaving my position in Yakima after only a year.

Having obtained regular full-time employment, I felt that I could now consider marriage. While in Berkeley, I had become acquainted with Betty Louise Brown of that city, who was to become my wife. She was sympathetic with my interests, as she still is, and frequently accompanied me on field trips even before our marriage. We were married at the end of my year of teaching at Yakima and had one happy summer together before I was called for army service. Our son, Robert Linville Hoover,

was born in 1943. Lin, as he is called, showed early indications of taking after his father. At the age of three, if anyone asked him what he was going to be when he grew up, he replied, "a botanist." In later years he has become more enlightened but always shows interest in any scientific subject. Field trips in recent years have generally been family outings.

During my military service I was stationed first at the University of Washington in Seattle. Later I was assigned to a hospital unit, in which I spent fifteen months in England and six months in France. War time can hardly be a happy time, especially to a man separated from his newly acquired family, but my horizons continued to expand as I became familiar with scenes I could never have otherwise viewed. Always the die-hard botanist, I tried to learn the wild and cultivated plants of every locality where I chanced to be. I count myself fortunate to have been able to visit the Royal Botanic Gardens at Kew. Also I tried to make the acquaintance of British and French botanists so far as possible.

Returning to my wife's home in Berkeley at the beginning of 1946, I began at once to search for a job. Haunting the office of the University of California employment service, I kept accepting in silence the statement of the lady in charge that there was no call for a person with my particular qualifications. At last one day I spoke up. "Are you sure there are never any jobs I might fill?"

"Well," was the reply, "there is an opening at the California Polytechnic School at San Luis Obispo, but *you* wouldn't be interested in *that!*"

I thought I might be interested in just that, and at the California State Polytechnic College, as it was soon to be known, have found opportunity for service in which my natural ability and training can be put to use. The serious business of earning a living now occupies most of my attention. Sometimes, when particularly fortunate, I am called upon to teach only botany. Among other courses over which I have presided are general zoology, genetics, bacteriology, plant and animal ecology, and agricultural biochemistry. The difficulty of presenting these subjects adequately may be imagined.

Even so, I may be regarded as having unusual opportunities for work which gives enjoyment and enlightenment. The region of San Luis Obispo is highly interesting botanically, and much of my vacation time, days off, and field trips with classes have been given to field study and collection of plants. A grass discovered in this area and named *Agrostis Hooveri* Swallen seems to me to offer possibility of development as a cultivated forage plant for arid situations. Another newly described plant of this country, *Ceanothus maritimus* Hoover, should prove to be a desirable ornamental shrub.

Because of the war and changes of residence, most of the bulbs which I once had at Modesto have been lost. When I moved to San Luis Obispo, I salvaged a few remnants from them and again began to build up a collection of Californian bulbous plants. A move in 1953 from one

house to another in San Luis Obispo set this project back, but I shall probably keep my interest in the cultivation of these plants as long as I have a little yard and can work in it. At present I have only a few species of *Brodiaea* and related genera, but this is written after only one year in our new home.

A year or so after I came to San Luis Obispo, I began to develop a new interest; namely, the cultivation of cacti and other succulent plants. These plants charm me by their unusual and beautiful shapes and their exquisite flowers. Besides, as with the brodiaeas, many fine plants can be kept in a small space. I keep a rather nice collection of cacti at the college, where it serves to attract general interest and to illustrate botanical principles. Behind my back I am known to the students as "Cactus Sam."

Our home is situated on a hill in the frost-free zone (so called because cold air settles in low places) and so offers interesting horticultural possibilities. The sloping front of our lot is rapidly filling with such succulents as Crassulaceae, Mesembryanthemums, Aloes, and smaller sorts of Agaves. There are strong drying winds which do not harm such plants but would discourage more conventional sorts of flowers. Among the amaryllids, *Haemanthus coccineus* and *Nerine filifolia* are doing well and are in bloom as this is written (September).

As if there were not enough other details calling for attention, I conceived the idea of a botanical garden on the college campus. As a consequence of the fact that California Polytechnic is a state college, no funds are available for the development of such a project, but the enthusiasm of a few students and instructors gives grounds for hope. Some two years ago, administrative approval was given for the use of a portion of the campus which seems excellent for the particular purpose in view. A permanent stream flows down a narrow canyon in the hills. The steep slopes on either side are partly wooded with live oak and laurel and partly open and rocky. A few hillside seepages add to the variety of habitats which makes this area particularly suitable for its intended use. Under the circumstances, it is hardly possible that this botanical garden can develop in the same way as the more conventional sort of establishment so designated. Some visitors, expecting an intensively cultivated plot of ground with plants set out in rows, pass by the botanical garden without recognizing it. However, as an outdoor laboratory where plants can be studied in a natural environment, the area has unusual possibilities. Obviously, the native plants of California will play a large part in the development of this garden. Species native to other regions but adapted to the local climate have also been planted, with particular emphasis on xerophytes. Some outstanding students have been most cooperative in building paths and otherwise contributing time and labor. There is reason to hope that the scientific usefulness of the California Polytechnic College botanical garden will increase year by year.

My schooling ended seventeen years ago; my education, I feel, has now well begun. Teaching leaves too little time for work with plants, but who holds a job without some frustrations? What I have learned

about plant life, and about life in general, during the eight years of my employment here, seems to me to outweigh all that went before. I pray that I may never lose either the desire or the ability to learn.

FURTHER OBSERVATIONS ON **BRODIAEA** AND SOME RELATED GENERA

ROBERT F. HOOVER

This series of notes constitutes a review of my previously published work on *Brodiaea* and some of the other genera which were once included under that name. Particular emphasis must be placed on the fact that further progress in the study of this group of genera will most probably be attained by the methods of cytology and, especially, genetics. A very important contribution to the cytology of these plants has been made by Dr. Madeline Palmer Burbanck, whose findings were published in two articles in 1941 and 1944. Frequent reference to her work is made in the following pages.

Information on the genetics of this group is not likely to be available soon because, for one thing, botanists with adequate training in genetics are usually employed for work on a specific project of recognized economic importance and seldom have the time and inclination for extra research in addition to their employment. Also, such investigations would require a long time, as the plants never flower before the second year and very rarely before the third year from seed. If any young geneticist should read these words, it is to be hoped that the total lack of any information on this subject will challenge him to undertake it as a life-long project.

The following discussion is arranged by genera. Under *Brodiaea* and *Triteleia*, the number preceding the name of each species indicates the order in which those species were placed in my revisions of those genera. Lack of mention of a species here indicates that no significant additional information regarding it has become available to me since the publication of my earlier studies on these genera, as listed in the references at the end of this article.

BRODIAEA

1. *B. elegans* Hoover. Burbanck reports a somatic chromosome number of 32 for this species. In view of the facts that this chromosome number is different from that of *B. coronaria* and that all plants of this complex seem to be fully fertile, it seems probable that the specimens mentioned as apparently intermediate between the two species are not true hybrids. Rather they may be interpreted as the phenotypic expression of gene combinations derived from the presumed common ancestor of the taxa included in the section *Coronariae*. [Cf. Dobzhansky (1941), p. 348 *infra*]. An extensive series of chromosome counts is needed before a more precise opinion can be expressed.

2. *B. coronaria* (Salisb.) Engler. As previously interpreted by me, this is a highly polymorphic species. There has not been sufficient new information to warrant a change in this view, but it is probable that genetic and cytological evidence correlated with field studies would at least make possible the recognition of additional varieties, and would perhaps indicate that some of the varieties should be classified as species.

A somatic chromosome number of 42 was reported by Burbank for a plant from Corvallis, Oregon. As a collection from Corvallis was identified by me as *B. elegans*, it may possibly be questioned whether this number is universal in, or even typical of, *B. coronaria*. In any event, no other published chromosome count is unmistakably referable to this species.

At least it seems certain that *B. synandra* var. *insignis* Jepson does not belong to *B. coronaria*. As long as it remains known from the poorly preserved type collection only, it is inadvisable to publish a new name for it, but I venture to predict that if rediscovered it will prove to be a distinct and well marked species.

3. *B. jolonensis* Eastw. The expected occurrence of this species in Baja California, Mexico, is verified by a collection made 11.6 miles north-east of Sauzal on road to Guadalupe (north of Ensenada), May 23, 1941, Wiggins 10,089.

4. *B. minor* (Benth.) Wats. Working with two kinds of plants obtained from Carl Purdy, Burbank found the chromosome number to be 12 in "*B. minor*" and 32 in "*B. Purdyi*" (using the names applied to the plants by Purdy). This difference is difficult to reconcile with oral statements made to me by both Dr. W. L. Jepson and Miss Alice Eastwood that the original collection on which *B. minor* was based is quite identical with the subsequently published *B. Purdyi* Eastwood. Also, while recognizing considerable variation within the species, I am still unable to find any externally visible character which would separate specimens into two sharply defined groups.

Two explanations may be suggested. One possibility is that the plant called *B. minor* by Purdy is a very rare species of which I have seen no specimens or have failed to notice their distinguishing features. The presence of offsets on the corms of only two of the collections referred to *B. minor* (Am. Midl. Nat. 22: 566) tends to support such a speculation.

The other alternative, suggested by Burbank, is that the "*B. minor*" of Purdy is *B. minor* var. *nana* Hoover. If this is true, then, in view of the different chromosome numbers, the widespread existence of individuals showing all gradations between the two extremes, all apparently forming full capsules of fertile seeds, is most puzzling. The problem may eventually be solved by an extensive cytogenetic study, using plants of known wild origin, and by breeding experiments.

7a. *B. leptandra* (Greene) Baker. It was previously stated that this plant is separable from typical *B. californica* by the presence of offsets, but some corrections should be made. Corms purchased from the Carl Purdy Gardens about 1947 had offsets but produced flowers and capsules which I regard as entirely typical of *B. californica*. If *B.*

leptandra is to be given a separate taxonomic status, it must be on other grounds.

Comparison of plants cultivated at San Luis Obispo showed considerable resemblance between *B. californica* and *B. leptandra*, but the two were distinct in some features. The corms of *B. leptandra* are shallowly situated, do not have the coats extend upward to form a fibrous sheath around the underground part of the leaves and scapes, and the offsets are much more slender than in the form of *B. californica* which has them. The parts of the flower, especially the perianth-segments, are narrower in *B. leptandra*. The capsule of *B. leptandra* is distinctly more slender, and the perianth-tube enclosing it is tougher in texture and more opaque than in *B. californica*.

These differences are not intrinsically of very great significance, but since there is geographical separation and a complete lack of any evidence of interbreeding or ability to interbreed, my present opinion is that *B. leptandra* is a distinct species rather than a variety of *B. californica*.

Brodiaea leptandra, a Californian endemic of restricted distribution, has been reported heretofore only from Sonoma and Napa Counties. The following record is therefore of interest: north side of Mt. St. Helena, Lake County, June 29, 1942, Hoover 5904.

DICHELOSTEMMA

No addition or correction can be made at this time to my previously published account of this genus. Attention may be called again to the need for experimental testing of the frequently expressed opinion that *D. venustum* is of hybrid origin.

TRITELEIA

1. *T. grandiflora* Lindl. Entirely on the basis of a study of dried specimens, *Brodiaea Howelii* Wats. and *B. bicolor* Suksd. were combined and referred to *T. grandiflora* as a variety *Howelii* (Hoover, 1941). Field observation in 1942 furnished confirmation of this detail of classification. In Yakima County, Washington, *T. grandiflora* var. *grandiflora** and var. *Howelii* occupy essentially separate areas but intergrade where they occur in proximity to each other. In accordance with the almost universal practice of contemporary botanists, the two might be maintained as separate species in spite of this apparent hybridization, if the morphological difference between them were a little greater. However, in living plants as well as in herbarium specimens, the shape of the stamen-filaments seems to be the only consistent basis for distinguishing two kinds of plants, and this solitary difference is subject to intergradation. The conclusion may be drawn that the two kinds of plants are genetically compatible.

2. *T. peduncularis* Lindl. Burbank found, in plants identified by my key as this species, chromosome numbers of 14 and 28, indicating the existence of diploid and tetraploid races. If these can be distinguished macroscopically, then unquestionably they should be separated

* Tautonomous designation required by International Code, Article 35.

taxonomically. Burbank has stated certain differences between them, in this manner supporting the opinion of Carl Purdy that two distinguishable kinds of plants have been referred to this species. My observations of living plants of *T. peduncularis* were admittedly limited and quite possibly involved only one of the two chromosomal races, but despite some variation I could find no means of separating the plants into two clear-cut groups, unless it might be the unusually small anthers of some specimens from Sonoma County. It is not known whether these small-anthered plants are diploid or tetraploid. The question of intra-specific classification in *T. peduncularis* may for the present be regarded as an open one, requiring more facts for a definite answer.

Assuming for the moment that it is possible to correlate other features of these plants with their chromosome number, then the question arises as to which is the true *T. peduncularis* and which requires a new name. This question is difficult to answer because, among other reasons, the two reported counts of chromosomes have not yet been correlated with the geographical distribution of the plants which they represent. Lindley's name, published in 1835, must have been based on a plant from the coastal area of California which collectors had visited up to that time, but it hardly seems possible to identify it confidently as one or the other of the two elements now known to constitute the species. One way out of the difficulty would be to designate some contemporary collection the neotype, as is authorized under the International Code of Nomenclature (Article 18), in view of the fact that the species was published before the type method had come into general use. I hesitate to take this course, however, without some knowledge as to what portion of the total distributional area of the species is occupied by each chromosomal race.

The problem has been complicated by the publication of *T. peduncularis* var. *longipedicellata* Eastw. (Leaf. West. Bot. 3: 138) without either knowledge or surmise regarding its chromosome number.

Referring to the kinds of species defined by Camp and Gilly (1943), *T. peduncularis* may exemplify either a "phenon" (p. 335) or a "euploidion" (p. 341), depending upon how readily the two segments of the species may be distinguished after further intensive study.

4. *T. laxa* Benth. Burbank has reported somatic chromosome numbers of 28—30 and 42 for plants with large anthers, which occur principally in the coastal region of California, and of 18 and 48 for two small-anthered races of the San Joaquin Valley region. Except for the difference in anther size, cytological distinctness is not reflected in external morphology. In the course of my field work, I have at times believed that I could distinguish as many as seven forms, presumably genetic races, of this species. However, in each case herbarium specimens appeared to bridge the gaps between these variants in such a way as to make any nomenclatural segregation impractical.

The chromosome counts suggest a basic haploid number of 6. It then seems remarkable that the forms with odd-numbered sets of chromosomes should, as they do in fact, develop as many fertile seeds as the presumed octoploid. A form of apomixis may furnish the explanation. Again referring to the definitions of Camp and Gilly, *T. laxa* as

now constituted may be subjected to the same two possible interpretations as for *T. peduncularis* stated above but is perhaps a better example of the euploidion. Until a complete geographic, ecologic, and cytogenetic study of variation in the species can be made, the different races may, if desired for horticultural purposes, be designated by non-technical names.

5. *T. crocea* (Wood) Greene. A remarkable occurrence of this species, or something very closely related to it, is now to be reported: 8 miles west of Weldon, South Fork of Kern River, Kern County, California, April 16, 1954, Hoover 8337. This locality is some four hundred miles southeast of the nearest place where *T. crocea* had previously been found. The plants were of local occurrence on north-facing slopes, in firm gravelly soil.

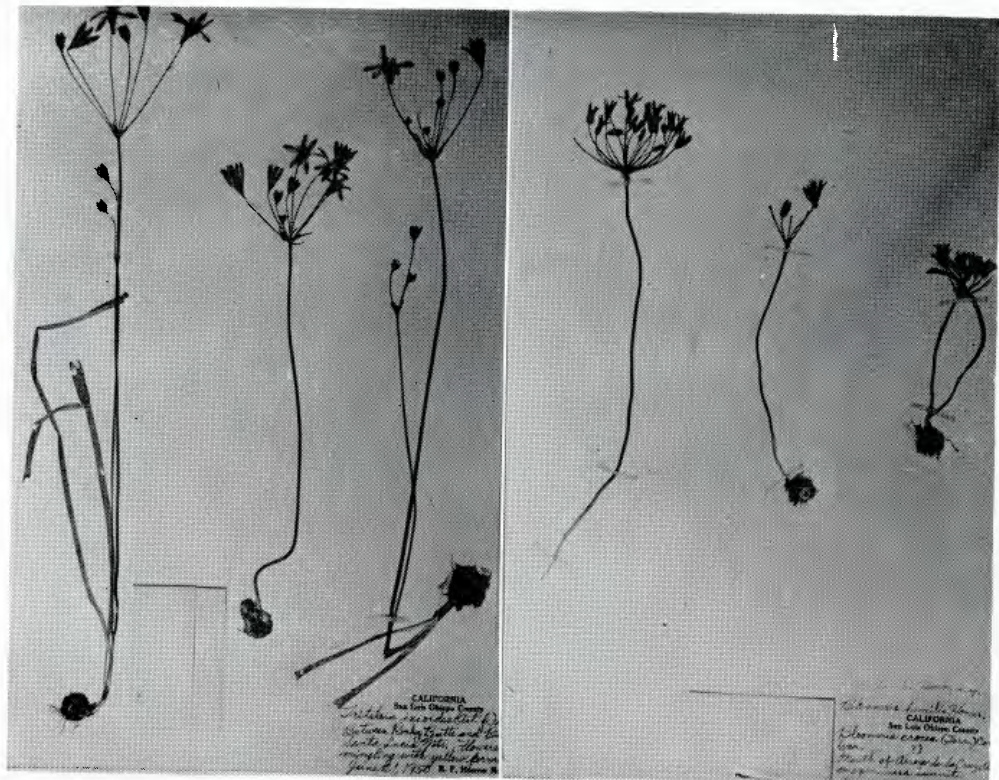
Certain discrepancies between the living plants and my description of *T. crocea* (Am. Midl. Nat. 25: 85) led me to re-examine herbarium material from the northern area of distribution of the species, and to compare it with the Kern County plants. The basal leaf in the Kern County specimens is always solitary, while the northern plants usually have two leaves. This fact, however, is not necessarily significant, because most species of the genus may have either one or two leaves, and in any event the number of leaves may depend on an environmental rather than a genetic cause. The perianth-segments were not longer than the tube in the Kern County plants, a feature which is in contradiction to my description of *T. crocea*. However, further examination of specimens shows that in some northern California plants the perianth-tube is longer than previously described. The error presumably resulted from the tendency of the perianth in dried flowers to split farther down the tube below the segments. (I have not yet seen living specimens of *T. crocea* from southern Oregon or northern California, my description being based entirely upon herbarium material).

One possibly significant difference remains. The anthers of the Kern County plants are only about 1 to 1.3 mm. long instead of 1.5 to 2 mm. long. In this respect, however, there is a close resemblance to *T. crocea* var. *modesta*, a blue-flowered plant occurring within the area of typical *T. crocea* and seemingly identical with it except in color and the slightly smaller size of its parts.

The apparent occurrence of *T. crocea* far to the southeast of its nearest previously known locality remains to be confirmed by evidence from genetics and cytology. If it is so confirmed, it will not, of course, be the only instance of a species restricted to two widely separated areas, one in the mountains of northwestern California and the other in the southern Sierra Nevada. For example, *Pinus Balfouriana* is a well known species of similar distribution at higher altitudes.

6. *T. Dudleyi* Hoover. The distinctness of this species has been confirmed by a recent additional collection: Upper Cold Spring Meadow, Peck's Canyon, Sequoia National Forest, Tulare County, California, July 29, 1950, Ferris and Lorraine 12,314.

8. *T. ixiooides* (Ait. f.) Greene. In my earlier study of *Triteleia*, three different plants were included in varietal status under this name.



Type sheets of *Triteleia ixiooides* var. *cookii* Hoover, var. nov.; and *Bloomeria humilius* Hoover, sp. nov.
Plate 2.

It is true that the three are in many respects very similar and difficult to separate by the usual sort of "key-characters," but there is apparently complete genetic isolation, a marked difference in physiological reaction or ecology, and, in regard to the true *T. ixiooides*, rather wide geographical separation from the other two entities. These facts seem better expressed taxonomically by giving each of the three taxa the rank of species rather than that of variety.

Considering that true *T. ixiooides* is found in the coastal region, easily accessible to botanists, it is rather surprising that no report on its chromosomes is available. At the southern limit of its range it intergrades with the recently discovered variety described below.

***Triteleia ixiooides* var. *Cookii* Hoover, var. nov.** Perianth white, purple-tinged on outside, its segments reflexed from mouth of tube [see Plate 2].
(Perianthio albo, segments reflexis).

Between Rocky Butte and Pine Mountains, Santa Lucia Mountains above San Simeon, San Luis Obispo County, California, June 21, 1950, Hoover 8010 (type, herbarium of California State Polytechnic College); Pine Mountains, May 7, 1950, Hoover 7904. Besides the extremes of var. *Cookii* and var. *ixiooides*, there were also found plants which were intermediate both in flower color and in angle of divergence of the perianth-segments.

The variety is named for one of my former students, Mr. Fred L. Cook of Atascadero, California. He is "connected with it"* by first making it possible for me to reach the very interesting locality where it is found, in that way contributing directly to its discovery. I regard this plant as one of the prettiest of the "white brodiaeas" and well worth cultivation.

The occurrence of spontaneous hybridization between *T. ixiooides* (section *Calliprora*) and *T. Bridgesii* (section *Hesperoscordum*) is of interest and significance. These two species occupy separate areas in nature but some years ago were planted adjacent to each other in my garden at Modesto, California. Seeds gathered from the plants of *T. Bridgesii* yielded many normal individuals of that species and two plants which must certainly have been of hybrid origin. The umbels of these two plants were similar in general appearance to those of *T. Bridgesii*, but the flowers on first opening were pale orange, later turning to pale blue. The filaments were unequal in length (a feature of *T. ixiooides*) and did not expand into a deltoid base as in *T. Bridgesii*, although they still were not forked as in *T. ixiooides*. The two corms in question were unfortunately lost soon after the flowers had been observed, but it should be possible again to produce this hybrid experimentally. The plants produced no seeds,—a fact which confirmed that this was a definite instance of interspecific hybridization.

* International Code of Botanical Nomenclature, Recommendations 33A and 37A.

8a. ***T. scabra*** (Greene) Hoover, **comb. nov.** ***Calliprora scabra*** Green, *Erythea* 3: 126. 1895.

This species is most readily separated from *T. ixioides* by its proportionately shorter perianth-tube and the smaller average size of its anthers. It flowers a month or more earlier than *T. ixioides* when the two are grown together, and hybridization between the two is not known to occur even if theoretically possible.

I believe *Calliprora aurantea* Kell. to be the earliest published name for the species here called *T. scabra* (Hoover, 1941, p. 90), but that name has again recently been identified with *Brodiaea gracilis* Wats. (= *Triteleia montana* Hoover) by W. A. Dayton (*Herbertia* 7: 79. 1941). No specimen of the original collection of Kellogg's species apparently now exists in any herbarium, and its description offers no conclusive proof of its identity. The name *Calliprora aurantea* is therefore rejected as "a long-persistent source of error."*

8b. ***Triteleia analina*** (Greene) Hoover, **comb. nov.** ***Calliprora scabra*** var. ***analina*** Green, *Erythea* 3: 126. 1895.

It has previously been pointed out that *T. analina* and *T. scabra* show extremely little apparent intergradation, in spite of geographical proximity and considerable overlapping of their distributional areas. I now believe that the few individuals which are intermediate in size represent independent variants, possibly induced directly by environmental conditions, rather than true hybrids. (Cf. also Dobzhansky (1941), p. 348 *infra*.) My present opinion regarding the status of *T. analina* is supported by the difference in chromosome number reported by Burbanck: 10 in *T. scabra* as contrasted with 50 in *T. analina*.

On the whole, *T. analina* resembles the geographically separated species *T. ixioides* rather than *T. scabra*. From *T. scabra* it differs in the proportionately longer perianth-tube and smaller size of its other flower-parts, the smaller angle of divergence of its perianth-segments, the smaller average size of the entire plant, and the lack of retrorse pubescence on the scape. From *T. ixioides* it differs in the smaller measurements of all parts except, interestingly enough, the length of the filaments, and, perhaps most significantly, in its consistently smaller anthers.

Triteleiopsis

The one species of this genus, *T. Palmeri* (Wats.) Hoover, was formerly believed to be restricted to Baja California, Mexico, but has been collected at the western base of the Gila Mountains, Yuma County, Arizona, by Ripley and Barneby in 1949. This record, already published in "Arizona Flora" by Kearney and Peebles, is repeated here to complete the account of recently acquired information on this group of genera. Dr. Kearney referred the specimen to me for identification.

Bloomeria

Although Burbanck (1944, p. 344) did not express agreement with my opinion that *Triteleia* is most closely related to *Bloomeria* rather than

* International Code of Botanical Nomenclature, Article 75.

to *Brodiaea* (Hoover, 1941, p. 74), it appears that the cytological data might be interpreted in support of my earlier view. Burbank reported the somatic chromosome number of *Bloomeria crocea* as 18, the same number as in one of the forms which I have referred to *Triteleia laxa*, and her drawings of the chromosomes of these two plants (1944, p. 342, figs. 2 and 3) show considerable resemblance in size and general appearance.

Recent study^o of the flowers is further informative. Descriptions of *Bloomeria* have customarily included the statement that the perianth-segments are distinct to the base, whereas *Triteleia* (or *Brodiaea* in the old inclusive sense, including *Triteleia*) has been described as having a perianth-tube. The perianth-tube, however, is very short in some species of *Triteleia* (Hoover, 1941, p. 74), and now in 1954 an examination of fresh flowers has shown that the perianth-segments of *Bloomeria crocea*, the type species of its genus, are actually joined at the base. This last statement may possibly not hold true for all specimens, but at least applies to those seen by me in the living state during this year. Furthermore, another species of *Bloomeria*, described below as new, has the perianth-segments coalescent at the base into a tube about 1 mm. long.

From these observations, the morphological distinction between *Bloomeria* and *Triteleia*, already weak, has been reduced to almost nothing. The filaments in *Bloomeria*, it is true, are described as bearing basal "appendages," but the same interpretation might with equal propriety be extended to *Triteleia ixioides* and a few species closely related to it, comprising the section *Calliprora* of *Triteleia*. The term "appendages" has actually been used in describing the stamens of *Calliprora* (cf. Abrams, Ill. Fl. Pac. St. 1: 399), although the structures so designated are not identical with those of *Bloomeria*. The lower portion of the filament in *Bloomeria* terminates in a cup-like depression (except in the plant called *B. Clevelandii*, which is discussed further on), whereas the corresponding structure in *T. ixioides* is flattened and forked at the apex.

The stipe of the ovary, which is of variable length in *Triteleia* and absent in *Bloomeria*, remains as the most convincing morphological difference between the two genera. Possibly the best argument for separating *Bloomeria* from *Triteleia* is a geographical one. That is, *Triteleia* is of very rare occurrence in California south of Tehachapi and the Santa Lucia Mountains, whereas *Bloomeria* has its center of distribution in southern California. On the basis of these few facts, together with Burbank's statements regarding the chromosomes, *Bloomeria* is yet maintained as a genus, although as a practical matter of identification it may be difficult for persons not familiar with the species to decide in which genus a particular specimen belongs.

Bloomeria humilis* Hoover, sp. nov.

Mature corm 10 to 18 mm. in diameter, often forming offsets; basal leaves one or two; scape rising 5 to 8 (in one plant 15) cm. above surface

* The photographs of the type sheets of this species and of *Triteleia ixioides* var. *Cookii* were made by Mr. David H. Thomson, to whom I hereby express my thanks.

of soil; involueral bracts ovate-acuminate, 3 to 5 mm. long; perianth golden-yellow, the tube about 1 mm. long, the segments 9 to 11 mm. long, each with purplish midrib, approximate near base, gradually curving outward; lower portion of filaments ("appendages" of authors) about 2.5 mm. long, not papillose (or sparsely so), terminating in a cup in which the upper portion is inserted and in a short blunt point on either side; upper portion of filaments about 4 mm. long; anthers about 1.5 to 1.75 mm. long; style 6 mm. long; capsule 4 mm. long [see Plate 2, right; and Fig. 1].

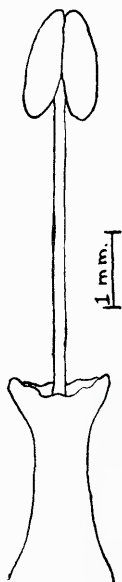


Fig. 1.
Stamen of
Bloomeria
humilis
Hoover, sp.
nov.

Cormus maturus diametro 10—18 mm. interdum propagines emittens; folia basalia unica vel duo; scapus 5—8 (interdum 15) cm. altus; involucri bracteae ovato-acuminatae 3—5 mm. longae; perianthium auratum eius tubo circa 1 mm. longo segmentis 9—11 mm. longis prope basem approximatis sensim extrorsus curvantibus unoquisque nervo medio aliquantulo purpureotincto instructo; filamentorum pars inferior (auctorium "appendices") ca. 2.5 mm. longa epapillosa (vel sparse papillosa) cullulo cusprido brevi hebetate utroque latere instructo in quem filamentorum pars superior 4 mm. longa inserta est coronata; antherae ca. 1.5—1.75 mm. longae; stylus 6 mm. longus; capsula 4 mm. longa.

Mouth of Arroyo de la Cruz (just south of), San Luis Obispo County, California, abundant on open mesa summit, June 15, 1951, Hoover 8060 (type, herbarium of California State Polytechnic College). The species has not been observed outside the immediate vicinity and is probably a localized endemic of that part of the coast. Plants brought into cultivation have maintained their distinctness from *B. crocea*.

Examination of flowers removed from dried specimens and soaked in water indicates that the lower portion of the filaments may be smooth in some flowers, papillose in others. A careful study of the fresh flowers was not made, because the possibility of the existence of an undescribed species of *Bloomeria* was not perceived at the season when they were available.

The above description emphasizes those features which distinguish *Bloomeria humilis* from *B. crocea*. The most significant differences may be summarized thus:

- 1a. Corm never with offsets; scape rarely less than 15 cm. tall; basal leaf always solitary; perianth-segments abruptly spreading from base; lower portion of filaments papillose*B. crocea*.
- 1b. Corm often with offsets; scape rarely more than 8 cm. tall; basal leaves 1 or 2; perianth-segments approximate toward base, gradually curving outward; lower portion of filament often smooth*B. humilis*.

The accompanying drawing of a stamen of *B. humilis* is to be compared with similar drawings published by Ingram (1953) representing the stamens of the three varieties of *B. crocea* recognized by him.

Bloomeria Clevelandii Wats., in spite of its yellow flowers, seems to me much closer to *Muilla* than to the type species of *Bloomeria*, and accordingly I offer the name:

Muilla Clevelandii (Wats.) Hoover, **comb. nov.**

based on *Bloomeria Clevelandii* Wats., Proc. Am. Acad. 20: 376. 1885. Living material of this species was compared with the type species of *Bloomeria* and of *Muilla* through the kindness of Mr. Frank Gander, who some years ago sent me corms and fresh flowers. As here interpreted, *Muilla* differs consistently from *Bloomeria* in the larger number of leaves which are neither keeled nor channeled (in this respect resembling true *Brodiaea* rather than either *Bloomeria* or *Triteleia*), in having a short style no longer than the ovary, and in not having the lower portion of the filaments terminate in a cup-like insertion for the upper portion. It is generally stated that the pedicels of *Bloomeria* (including by implication *B. Clevelandii*) are jointed and those of *Muilla* not jointed. This distinction may be of theoretical importance and in some genera is very readily demonstrated, but is difficult to apply to actual specimens of these particular plants.

CONCLUSION

Few new details of information have been reported here. Rather, attention has been called to some puzzling problems involving a highly interesting group of plants. The solution of these problems can hardly be accomplished by one individual, however able, but answers may eventually come from the cooperative efforts of people with thorough training in various branches of botany: the student of gross morphology, the microtechnician, the cytologist, the geneticist, and the ecologist, among others.

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AMARYLLIS REPORT 1955

ROBERT G. THORNBURGH, *Chairman*
Amaryllis Committee

It is clearly evident that there is an increasing interest in the subject of amaryllis. Amaryllis in the State of California are being used in greater number and variety than ever before in landscaping. This can be seen where clivia has taken on an important place in the decorations made by the landscape gardeners around new homes. The *Agapanthus* or LILY OF THE NILE which has always been unusually hardy in Southern California is seen in increasing numbers. Though the *Brunsvigia* or Cape Belladonna has been neglected, it seems to survive and thrive beautifully without attention.

The hybrid amaryllis not being "evergreen" are, perhaps, less well known on that account but are beginning to thrust themselves into the limelight by their great and spectacular beauty. With the amount of publicity given the hybrid amaryllis by those who market these bulbs the nation is gradually becoming acquainted with them. The Dutch have made good use of the average American's attraction to named varieties when purchasing flowering plants. This is desirable since each gardener's expectation matches his realization when a bulb does bloom.

It should be appropriate to mention here the passing of Mr. William Edward Rice on January 20, 1955. Born in Exeter, England in 1879 and coming to the United States, he occupied himself with the production of flowering bulbs for a period of twenty-seven years. Although his greatest activity was in the production of ranunculus, he also raised hybrid amaryllis during the same period supplying Vaughn's Seed Company. Only a few of his named varieties are still in existence. Of these one of the most beautiful is 'Lady Helen' named for his most gracious wife. This quiet gentleman was active in the local Bulb Society but was otherwise not prone to make his interests in amaryllis known to many and preferred to be absorbed in his most useful daily activity, his work.

1. REGIONAL ACTIVITY AND EXHIBITIONS

NEW ORLEANS AMARYLLIS SHOW, 1954

MRS. W. D. MORTON, JR., *President,*

Garden Circle, New Orleans

The 6TH OFFICIAL AMARYLLIS SHOW of New Orleans, sponsored by the GARDEN CIRCLE, and the AMERICAN AMARYLLIS SOCIETY, was held on March 27th and 28th, 1954. The entire floor of the McMain Junior High School Cafeteria was transformed into a mass of floral loveliness—the Amaryllis shown were never more beautiful. All New Orleans Garden Clubs were represented in both the artistic arrangements and horticulture divisions. The Junior Garden Clubs, the Public Schools, and the Juniors entered fine displays. Quality Amaryllis were shown more this



Fig. 2. The Queen of the Official Amaryllis Show of New Orleans, 1954. Miss Carole Anne LeCompte (center) is crowned by Commissioner Victor H. Schiro. Maids of Honor, Misses Lorraine Centanni (left) and Miss Madelyn Paciere (right). *Photo The Times-Picayune-New Orleans States.*

year than ever before—over half of the Horticulture Division was devoted to named Amaryllis clones.

The awards were made by 12 accredited Judges, and consisted of three Gold Trophies, two Sweepstakes, two Tri-colors, five AMERICAN AMARYLLIS SOCIETY AWARDS, and two Club Ribbons.

The most outstanding feature of the Show was the crowning of the Official AMARYLLIS QUEEN OF NEW ORLEANS, Miss Carole Anne LeCompte, lovely daughter of Mr. and Mrs. Calvin LeCompte. The Queen was crowned by the City Commissioner, the Hon. Victor Schiro.

Fourteen little girls formed an aisle for the Queen and her Court,—Miss Charmaine Thompson, last year's Queen, and two maids, Miss Lorraine Centanni, and Miss Madelyn Paciere. Donna Gayle Mackenroth was Crown bearer, and Lea LeCompte was Flower Girl.

[Editor's note.—After the crowning of the Queen, Commissioner Schiro called Mrs. W. D. Morton, Jr., President of the Garden Circle, and Chairman of the Show forward and presented her with a Gold Key to the City for her outstanding work in beautifying the City.]

REPORT ON THE AMARYLLIS SCHOOL GARDENS

There will be healthy competition in the 1955 Official Amaryllis Show when the six Amaryllis Gardens in the Public Schools begin to exhibit their Amaryllis from their Gardens. The P-T-A Clubs are now interested, and the Garden Circle is putting additional ladies on that Project. They have put an Amaryllis Garden in one of the Orphanages for retarded children. The McMinn Junior High School retained the Gold trophy this year for their exhibit at the recent Show.

—Mrs. W. D. Morton, Jr.

THE GREATER GULF COAST AMARYLLIS SHOW

MRS. P. B. SKINNER, JR., *Alabama*

The annual GREATER GULF COAST AMARYLLIS SHOW, sponsored by the AMARYLLIS SOCIETY OF MOBILE and THE AMERICAN AMARYLLIS SOCIETY, was held March 27 and 28, 1954 in the Murphy High School Cafeteria, South Carlin Street, Mobile.

The Show showed an advance over last year's show. The attendance was much greater, and a delegation from Texas came to the Show. The number of displays was greater than in previous years, and thus the number of competitors was increased. The commercial displays were outstanding—the Amaryllis were centered in sprays of greenery. Mr. Lou Costa won the trophy for the best Amaryllis specimen in the Show, and Mrs. Charles Taylor won first prize for the best arrangement.

An art exhibit was added this year of Amaryllis paintings. This was one of the outstanding high-lights of the Show. Regular art judges made the awards for the best paintings. More and more amateurs are taking up the painting of Amaryllis, and the competition in future years will be even keener. A trophy for the best Amaryllis painting in the Show was added this year.

BRUNSVIGIA DISPLAY AT THE CALIFORNIA
STATE FAIRL. S. HANNIBAL, *California*

The California State Fair which opened September second, 1954, with its centennial display, went to considerable effort to favor floriculture and outdoor gardening. The main exhibit building, patio area, and floral arrangement building had been considerably enlarged, covering more than three acres. A wide range of summer flowering plants were on display.



Fig. 3. Miss Carole Hannibal with cut scapes of *Brunsvigia* hybrids at the California State Fair, Sacramento, 1954.

This is probably the first time that Amaryllids were entered on the display list. A wide selection of white and colored *Brunsvigia multiflora* hybrids were furnished as cut flowers and occupied some eight feet of bench space. Replacement cut flowers were taken in every three days and the older umbels were donated to the floral arrangement groups. Several interesting arrangements were worked out using individual

blossoms on short pedicels. Examples on display included *B. multiflora rosea*, *B. multiflora alba*, the well known 'Hathor', the new 'Picotee' series, reds like 'Red Shadow', examples of the orchid type which have been derived from Allister Clarke's 'Glory', and various white and near white seedlings. Several forms of *B. rosea* were also entered such as *rubra*, Frank Leach's 'Grace', and seedlings of wild types collected in Stellenbosch.

Daily attendance at the fair ranged from 75,000 to 125,000 people. It is not known how many attended the horticultural exhibits, but the area was congested heavily most of the time. The Amaryllis display attracted considerable attention. Fortunately a number of reprints from the Bulb Society were available which gave general information on these plants, and a number of copies were passed out to interested people. Should this display become an annual affair, which it undoubtedly will, a simplified information sheet would be most desirable for the public and the staff handling the displays.

As a sequel to the Fair, Albert Wilson featured *Brunsvigia* x *multiflora* 'Hathor' and the newly registered clone 'Peaches and Cream' over the television on the San Francisco station KGO-TV on Sunday, September 19, 1954. In a good natured way he suggested that the writer rather stole the show in Sacramento, but it is self evident that Mr. Wilson has a weakness for these bulbs himself. It was reported that at the Fair he was observed trying to find two similar umbels amongst the seedlings. However, due to the wide variety of material on display there was little opportunity for even near duplications.

Appreciation is expressed for the able assistance and good judgment rendered by Mrs. J. G. Traub, and Mr. and Mrs. Ira Shepard who handled the displays and worked out some very effective arrangements.

VISITS WITH PLANT ENTHUSIASTS

LT. T. M. HOWARD, *Ft. Hood, Texas*

PART I.

Quite often enthusiasts in the field of horticulture are drawn together through mutual interests by the medium of correspondence. In this way it is possible for them to exchange ideas, information, and plant material; however few of them are afforded the opportunity to personally meet and know their fellow garden correspondents. More recently, thanks to improved highways and faster modes of transportation, the factors of time and distance are steadily losing their significance as barriers to traveling. In the past two years I have found it necessary to change my address several times as a result of military commitments made while in College. This moving about has afforded excellent opportunities to visit several plant enthusiasts with whom I had become acquainted through correspondence, as well as other prominent horticulturists. This, coupled with vacationing and my love for traveling, has resulted in the acquisition of new friends, exchanging of information and ideas, as well as satisfying my natural curiosity.

While still in college, in the summer of 1951, I was fortunate enough to meet interesting folks while visiting relatives in the Los Angeles, California area. My first stop, at the Oakhurst Gardens in Arcadia, of Out-of-the-ordinary-bulb fame, came as a pleasant surprise in the form of Mr. James Giridlian, the well known proprietor. Mr. Giridlian was a very cordial, quiet spoken man with a wonderful collection of exotic and rare bulbs and plants growing among scattered gnarled old Oak trees. Although I did not realize it then, this meeting proved to be an eventful one, in that through him, I was able to introduce species of native Texas bulbs to the general bulb growing public. In addition, I was encouraged to write about them for several publications, and thus help to assure their acceptance and establish their popularity.

Later the same day, I stopped at La Verne to visit the famed gardens of Cecil Houdyshel, but he was not at home. My trip was not a total loss though, as his charming wife was in, and she very graciously escorted me about the grounds, pridefully pointing to the rows of hybrid Brunsvigias that were then in bloom. The variety "Hathor" with its pure white funnels with ivory throats was particularly impressive. I was amazed at the large field of *Crinum*s and *Amaryllis*, but was even more surprised to see a row of *Scilla maritima* sending its tall spires of white flowers aloft from the bare earth. I was a bit saddened to learn that they planned to gradually place more emphasis on greenhouse plants and less on field material. This is understandable, when one considers the present labor costs, and the rising popularity from such pot plants as the profitable African Violets. Alas, bulb growers can only sigh and wring their hands.

Back in Texas, I had the opportunity to visit Rev. C. W. Hall in Austin. Although he is a fancier of *Crinum*s and *Hemerocallis*, he is perhaps best known for his part in popularizing the little fall blooming *Rhodophiala bifida* (syn. *Amaryllis bifida*) erroneously known as *Amaryllis advena*, in both the red and pink forms. Mr. Hall, a Methodist minister teaching Religion at the University of Texas, is a collector of *Crinum*s, and has done much within the State to popularize them as garden subjects. He has attempted crosses between several species, but growing flowering seedlings from this group of plants can be a slow, tedious process.

Through the aid and encouragement of Dr. Victor L. Cory, former field botanist at Southern Methodist University, who encouraged my own interest in native bulbs, I was able to correspond with, and eventually meet Mr. Fred B. Jones, of Corpus Christi. Mr. Jones and myself had parallel interests in native bulbs, particularly the native *Zephyranthes*. By careful observation, Mr. Jones, an excellent amateur botanist, discovered a large flowered yellow *Zephyranthes*, closely akin to *Z. smallii*, growing in the coastal country in the vicinity of Taft, Texas, not far from Corpus Christi. This discovery kindled an enthusiasm for other species and varieties of this group for Mr. Jones, and has led to his collecting and growing bulbs from the coastal plains, the lower Rio Grande Valley, and Mexico. My meeting with Mr. Jones occurred while our Veterinary class was visiting the King Ranch in April of 1953. Our

mutual interest in Amaryllids, particularly the "rain Lily" group proved to be a solid common meeting ground for friendship. Through him, another important friendship eventually materialized by way of mutual interests. In Brownsville, another independent enthusiasm for these plants had paralleled our own, in the persons of Mr. and Mrs. Morris Clint. Like Mr. Jones, they were excellent amateur botanists, and green thumbed growers of tropical and subtropical exotics. Their trips into Mexico had unearthed some interesting plant material, some of it for the first time. It was inevitable that our similar interests in Amaryllids should eventually result in our corresponding and exchanging bulbs. Beginning with *Zephyranthes clintiae*, this inspiring couple have collected so many *Zephyranthes* in south Texas and Mexico that many years will pass before the proper identity and placement of their collections can be made by botanists. Although they are technically amateurs, many professional botanists might well be envious of their accomplishments.

[Part II, will be published in 1956 HERBERTIA.]

GARDENING IN THE CLEVELAND PUBLIC SCHOOLS

JOHN F. COOKE, JR., *Ohio*

Horticulture, as a part of the science program, is taught formally in the CLEVELAND PUBLIC SCHOOL SYSTEM in classes from the third grade through high school, and voluntary projects are available to kindergarten-primary teachers. It is a year around program based on short-term projects that are usually finished in one semester, or over one summer. The program was begun at the turn of the century, but was inadequate and purely voluntary until the appointment of Paul R. Young as SCHOOL GARDEN SUPERVISOR in 1926.

At first the program was administered through itinerant teachers, but this was generally unsatisfactory, and the system of short-term projects now in use was evolved. In 1939, Darian H. Smith joined the staff and the program continued to expand. There are six "tract gardens" comprising twenty-one acres, subdivided into individual plots for children's summer gardens. A teacher and a garden superintendent are in charge of each. A greenhouse with seven thousand square feet under glass is maintained at WEST TECHNICAL HIGH SCHOOL, where all aspects of commercial floriculture are taught and where various ornamental plants and some fifty-five thousand vegetables are grown each year for the home gardens. Coordinated with elementary and high school courses are adult night classes in general gardening and flower arrangement. Short courses in various related subjects are made available from time to time.

Those projects of interest to readers of HERBERTIA are the PAPER-WHITE narcissus and fall bulb projects. PAPER-WHITE narcissus are used with three grades in two ways—classroom and voluntary home projects. For the third grade, eight bowls, gravel, and twenty-four bulbs are supplied for each classroom free of charge. Instructions and litera-

ture are supplied, as well as lesson plans. For the fourth and fifth grades, a voluntary home growing project is available. For thirty-five cents, each student receives three bulbs, gravel, a bowl, and instructions. A fee is charged because the student seems to have more interest resulting from a tangible investment. It is nominal, and covers actual cost of the materials only in most cases.

The fall bulbs are furnished to upper elementary classes in three ways. First, a unit of four 6-inch azalea pots, ten tulips, six daffodils, and soil is supplied to each class at no charge. The bulbs are planted as a classroom project and then taken to one of four centers for overwintering. Near WASHINGTON'S BIRTHDAY, they are returned to the classrooms, where the students force them. Second, extra potting units are available at a dollar-fifty each. Three hyacinths, pot, and soil are also available for forty cents. Third, units of bulbs for outdoor planting around the schools are available at cost, with the supervision of one of the horticulturists of the department if desired. The bulbs are all top quality, although older varieties are used because of cost. Double-nose Narcissus, varieties such as 'Rembrandt' and 'King Alfred', top-size tulips, and bedding hyacinths are offered.

Amaryllis are grown and offered to teachers as a special project, but dried-off bulbs are a bit expensive and difficult to start for students. However, with the assistance and supervision of Mr. Wyndham Hayward, we are planning experiments to find an easier method to root dormant bulbs, and perhaps in the future we may be able to offer them to school children.

Our latest major development was started three years ago. At the request of the principal, we will provide supervision and heavy labor for a landscaping development of the school grounds. The children do as much of the planting and fund-raising as possible, and later help with the maintenance. In industrial and crowded areas, we feel that this is especially valuable, because there are frequently no plantings or only the poorest sort nearby. The program is always changing and expanding, and we believe provides much in the way of civic betterment and overall education.

(See also the outline of the School Gardens Program in the Cleveland Public Schools which begins on page 131.)

AMARYLLIS JUDGE'S CERTIFICATES

Up to the time of going to press, the following *Amaryllis* Judge's Certificates of the American *Amaryllis* Society have been issued:

1. Mrs. W. D. Morton, Jr., 3114 State Street Drive, New Orleans, La.
- 1a. Mrs. Douglas Black, 2202 So. Carrollton Ave., New Orleans, La.
2. Mrs. Charles Buckman, 21 Farnham Place, New Orleans, La.
3. Mrs. Marta La Mar, 1203 Marengo St., New Orleans, La.
4. Mrs. Fred Doescher, 6623 Louis XIV St., New Orleans, La.
5. Mrs. Wildray Tudury, 155 Homestead Ave., New Orleans, La.
6. Mrs. J. S. Petty, 1613 Mirabeau Ave., New Orleans, La.

7. Mrs. E. F. Lehmann, 2201 Paris Road, Chalmette, La.
8. Mrs. Charles Arthus, 231 Porteous St., New Orleans, La.
9. Mrs. E. A. Rose, 1509 Socrates St., New Orleans, La.
10. Mrs. Guy Leefe, Jr., 5332 St. Bernard Ave., New Orleans, La.
11. Mrs. A. J. Tomassi, 3915 Elysian Fields Ave., New Orleans, La.
12. Mrs. John Creevy, 3135 State Street Drive, New Orleans 25, La.
13. Mrs. Lilly Ferguson Fisk, 4202 Wildwood Road, Austin, Texas.
- 13a. Mrs. Virgil Jackson, 524 Betz Place, New Orleans, La.
14. Mrs. Conrad Meyer, Jr., 1732 So. Carrollton Ave., New Orleans, La.
15. Mrs. Claude Pumilla, 5979 Gen. Diaz St., New Orleans, La.
16. Mrs. George Nusloch, 3235 Jefferson Ave., New Orleans 25, La.
17. Mrs. Clyde Griffith, 6014 Vicksburg St., New Orleans, La.

EXAMINATIONS FOR AMARYLLIS JUDGE'S CERTIFICATE. For information about taking the examination for the AMARYLLIS JUDGE'S CERTIFICATE of the AMERICAN AMARYLLIS SOCIETY, please write to Mrs. W. D. Morton, Jr., 3114 State Street Drive, New Orleans 25, La. Judges are requested to attend a local refresher short course each year, if possible, in order to keep up with progress in this group.

2. SPECIOLOGY

[EVOLUTION, DESCRIPTION, CLASSIFICATION AND PHYLOGENY]

RE-DISCOVERY OF **ZEPHYRANTHES CONCOLOR**

MRS. MORRIS CLINT, *Texas*

On May 12, 1954, Fred B. Jones of Corpus Christi, Texas, my husband Morris and I set out for Mexico on a trip which was to prove a momentous one. The trip was one of those affairs which seem to mushroom out of nothing—a short vacation to the city of San Luis Potosí planned by Morris and myself; Fred's offer to supply us with data on known collection locations of *Zephyranthes* species native to the immediate area; a chance exclamation of recognition by our farm hand, José, who is from the neighboring state of Aguascalientes, Mexico, upon seeing early blossoms of *Z. grandiflora* in our garden. Fred had done considerable research on *Zephyranthes*, particularly those species known to be native to Mexico. His promised letter, listing *Z. concolor*, *Z. verecunda* and *Z. lindleyana* and giving the locations in the state of San Luis Potosí where these species had formerly been collected by the botanists, Pringle, Schaffner, Parry and Palmer, arrived a few days before José noticed *Z. grandiflora* and made his now famous remark, "We have flowers like those in Aguascalientes except that their color is yellow." Thinking that perhaps he meant *Z. longifolia*, we asked, "Small ones, José?" You can imagine our excitement when he answered, "No, we have those, too, but there are large yellow flowers, about the size of these," indicating *Z. grandiflora*. We were immediately and elatedly certain that José's "large yellow flowers" could be none other than *Z. concolor*, a species which has long been lost to cultivation. Thoughts of a staid vacation were promptly forgotten and excited plans for the quest of *Z. concolor* were soon under way. Fred needed little urging to accompany us and there began a frenzied period of preparation—letters flew back and forth from Brownsville to Corpus Christi; maps of all kinds were checked and re-checked; routes and counter-routes were plotted and timed; José was quizzed and questioned at great length. Our enthusiasm received quite a jolt when we discovered that only two of Fred's locations, Bocas and Charcas, could be found on a road map and learned that the road to these towns was little more than a trail, for we remembered that most of the early botanists had travelled by railroad and many of their collection points are still inaccessible to the average motorist. However, we were not discouraged very long, for our endless questioning of José led us to believe that the range of *Z. concolor* was more extensive than botanical literature has revealed, as he assured us that the bulbs were to be found scattered over the entire state of Aguascalientes and that he had seen them along the roadside in the state of Zacatecas as well. We selected the middle of May for our

departure since José's statement that the bulbs bloomed in the month of May, after heavy rainfall, seemed to be confirmed by the dates of collection in the data furnished to us by Fred.

The three of us made a companionable trio, for Fred is a confirmed amateur naturalist and proved to be as fascinated by the biology and topography of Mexico as we have always been. Morris took the wheel and was to cover the area ahead, I had the right front and Fred the left rear observation post. As it was Fred's first trip to San Luis Potosí by



Fig. 4. Flowering habit of *Zephyranthes concolor*: (left), June 27, in bud, evening before opening; (center), June 28, 8 a. m., showing almost flat face, flower almost erect; (right), June 28, 5 p. m., showing change in form and position of flower. Photo by Mrs. Morris Clint.

automobile, we had allowed time for frequent stops so that we could all wander about at intervals and enjoy the scenery and the plants at close range. An extra day was allotted to the mountainous road between Antiguo Morelos, Tamaulpas, and Ciudad del Maiz, in the state of San Luis Potosí, for this 50 miles or so of Highway 80 is one of the most beautiful drives in Mexico and sustains a fabulous assortment of plant life. Here, as is usual in seasonal rain forests, one is surprised to find plants normally associated with desert conditions happily established with those known to be moisture loving—*Hechtia*, cacti and *Agave* growing side by side with ferns, bromeliads and orchids. Each change

in elevation brings something new of interest and the time always passes quickly, as one sees many old acquaintances established in their native habitat and encounters an ever-changing array of strange new lovelies.

From 1500' to 1800' elevation, *Beaucarnea* is found in vast numbers. These mammoth-trunked trees, clothed at the tips of their branches with rosettes of narrow, ribbon-like, gracefully recurving leaves, are seldom without some sort of floral display and now carried great panicles of vari-colored seed pods—from cream or greenish white through various shades of pink and rose to a deep rust-red. Apparently the color varies with the amount and intensity of sunlight that the panicles receive, for we know that the seeds do not ripen until sometime in early winter.

A little farther on, we stopped at a place that Morris and I have privately named "Chamal Ranch," for a species of *Dioon*, known to the natives as "Chamal," is to be found here in great abundance. The lower fence of the ranch is some distance up the mountainside and the road travels through a broad, rocky shelf at this point, so that we were able to walk about and enjoy these lovely cycads. Recent rains have brought forth new crowns of downy leaves, some purplish and some silvery-grey—still soft and pliable, yet giving some hint of their ultimate fern or palmlike beauty. One finds, also, numbers of pretty, dwarf fan palms with very slender trunks. Fred noted that many of the larger specimens are decumbent and we presumed that the trunks are not strong enough to support the heavy crown of leaves and the numerous, much-branched inflorescences. We had seen these two plants together in great numbers on a bare, sunny hillside at a much lower elevation and now decided that the hill had been man-cleared, for the species are so much more beautiful here and seem so much more at home in this heavily shaded area.

Another few miles brings two other cycads—a dwarf *Zamia* with dark green, papery leaflets which are narrow and slightly toothed on the edges; a species of *Ceratozamia* with long, recurving, pinnate leaves which carry many broad, leathery, dark green leaflets. At this time of year, the bronzy color of the new leaves on the latter makes them easy to spot against the green background of the heavy vegetation. Fred was so intrigued with these lovely plants that he narrowly missed a bad tumble when a rock slipped as he was climbing the steep embankment to get a closer view.

At last we approached the area where one might expect to see *Zephyranthes* in some quantity and we drove slowly and hopefully watched for blooms. A careful search on several stops revealed many bulbs in foliage and quite a few scapes in seed, but not a single blossom. Rainfall through the mountains thus far had been plentiful, if one could judge by the lush green of the vegetation—in fact, we were rushed on our way by a sudden downpour, and wondered if this shower would bloom some of the bulbs in time for our return trip. We were now about 4200' in elevation and almost at the edge of the rain forest. Within the next few miles, as one climbs still higher, the vegetation thins noticeably and the country becomes appreciably more arid as one approaches the western side of the mountain range.

As we came to the more open territory a few miles from the valley of Puerto de Lobos, our rain left us abruptly. We were acutely disappointed to find Puerto de Lobos dust-dry and brown, and the season almost a month late. We looked with regret at the parched cliffs and slopes bordering the valley, for we have seen these solid pink with *Zephyranthes* blossoms. We poked around in the dried grasses and weeds at the base of the rocks but found no signs of the bulbs, so



Fig. 5. Leaves of *Zephyranthes concolor*, 14 inches long, $\frac{3}{8}$ to slightly over $\frac{1}{2}$ inches wide. Photo by Mrs. Morris Clint.

reluctantly and without stopping, we drove by Canyon de Borregos, where we had hoped to see *Z. clintiae* in bloom. We found it hard to believe that such a few miles could make such a big difference in the time and quantity of rainfall.

Beyond Ciudad del Maíz, we drove through the last of the mountains that we were to see for some time, rocky and barren except for desert species of *Agave*, *Dasyllirion*, *Yucca*, *Hechtia* and cacti. We have been told by one of the professional collectors that these particular hills are some of the richest in fine cacti species in all Mexico. We were delighted

with the highly colored forms of *Agave stricta*—rose, purple and deep red—which cover the steep hillsides, and were charmed with the bright yellow clumps of *Hunnemannia fumariaefolia*, the Mexican Tulip-Poppy, which seem to grow and thrive on thin air. We noticed a species of Ocotillo which seemed different from those to be found in West Texas, for the flowers were dull orange instead of red, but the plants were not too abundant and we were never able to stop when we caught sight of a group of them within easy walking distance.

On the desert plateau, there was little evidence of spring rains and we began to wonder if we were to find the area around the city of San Luis Potosi dry, also, and our trip fruitless. However, about 75 miles from the city our spirits soared, for we began to see signs of fairly recent shower activity, with standing water in the ditches and low places. This desert wasteland seemed a strange place for *Zephyranthes* but we made frequent stops to search for them, for we have long since learned that these little bulbs are quite often found in the most unlikely places. At last, and quite by accident, we were rewarded! As Fred bent down to examine a small cactus plant at the base of one of the low desert shrubs, he was amazed to see a tiny yellow rain lily. The flower appeared to be closing, but was very plainly *Z. longifolia*. We discovered many of the bulbs in bloom, their segments barely cracked open, and an even greater number of scapes with mature or open seed capsules. We were to find this species in quantity at every place we stopped while on the plateau and saw many bulbs in bloom, if one could call it that, but we never saw an open flower. We knew this to be a failing of the species, but have had fairly open flowers in our garden, so couldn't help but wonder why the blossoms should not be of better quality here in their native habitat. Since this time, bulbs of *Z. longifolia* from West Texas have bloomed in our garden under varied moisture conditions and we found that only under a plentiful supply of soil moisture at the actual blooming date of the blossoms do they give a successful performance.

We spent quite a little time at this spot, for we were thrilled at finding the first *Zephyranthes* blossom of the trip and pleased to have ourselves seen *Z. longifolia* in central Mexico (Schaffner found it in S. L. P. in 1877). The site was not without beauty for there were numerous specimens of *Yucca australis*, many of which were in full bloom—the lovely, cream white flowers hanging in long, pendent panicles. After taking a few color photos we all searched very carefully for some signs of *Z. concolor*, but without success. Very reluctantly, we finally drove on, for time was creeping up on us.

We continued to pass through intermittent shower areas, but several short exploratory stops revealed nothing but the ubiquitous *Z. longifolia* until about 45 miles from San Luis Potosi, when Fred and I called out almost together. We had both seen the unmistakable flowers of *Zephyranthes* but, strangely enough, Fred had seen white ones and I was sure that they were pink. As we piled out of the car, we found that we were both right and later discovered an intermediate form, a smaller blossom of light pink. It was very late in the day and the flowers were closing

rapidly, but we attempted color photos anyway. By the time we had finished with the group of light and dark pink flowers, we found to our dismay that all of the white variety were completely closed. As there were still many buds, we resolved to return the next day—but events decided otherwise.

This locality was a little different from the territory we had been passing through—slightly higher and very rocky, with heavy outcroppings of caliche. Altitude was 5800'. We were to discover that the pink, red and white *Zephyranthes* seemed to choose these rocky soil formations. Needless to say, we wandered about for some time, allowing our-

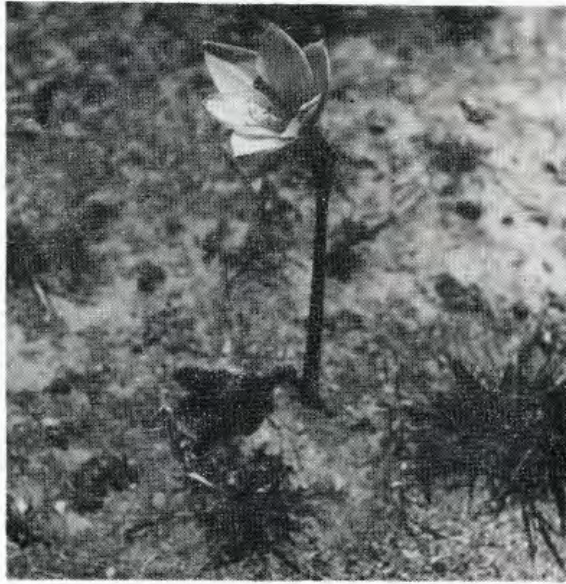


Fig. 6. *Zephyranthes concolor*; 18½ mi. S. W. of San Luis Potosi; about 1/3 nat. size; growing among grassy-like plants and various irids, etc. in red soil. Photo by Mrs. Morris Clint.

selves just enough time to reach the city before dark. *Z. longifolia* was present in abundance and Morris found one clump of what appeared to be *Z. brazosensis* with several freshly opened flowers, but none of us saw anything which could possibly be *Z. concolor*. Morris questioned a young rancher who chanced by on a burro. The young man seemed pleased at our interest in the flowers and remarked that we were the first people that he had ever seen stop to admire them. He said they were called "Mayitos" as they usually bloomed with the first rains of May and that we were very lucky to have found them in bloom for there had been so little rainfall. When asked if there were large yellow flowers anywhere near he replied that he thought so, but that they bloomed in June, after

heavier rains. Shortly afterwards, Morris and I stopped an old woman who was on her way to a nearby village with a large basket balanced on her head. She was a pleasant soul, very interested in the flowers and well informed about their habits. She said that all of these now in bloom—the white, the pink, the rose, the small yellow (*Z. longifolia*)—were called “Mayitos,” but that there were also large yellow and large, pure white flowers which bloomed in June, with the much heavier rainfall. These she called “Mañanicas” (“Mañanitas” is also used). The word was such a tongue twister that we did not at first realize that it was derived from the word “Mañana” and means “daybreak” or “very early in the morning.” I rather think that the derivation in this instance stems from the other meaning of the word, “tomorrow”, and is colloquially used to distinguish the later blooming bulbs from the “mayitos”, but we have yet to find anyone to corroborate this. When asked where these “Mañanicas” were to be found, she was a little vague as to exact locations but said that they were in groups “here and there” all along the highway in that vicinity. The old woman seemed very partial to the white flowers, referring often to their size and their white purity—but these still remain a mystery, perhaps to be solved at a later date. These two conversations were highly interesting and most exciting, but also very disturbing. It now seemed certain that we were on the trail of *Z. concolor*, but were we to be a month too early to see the bulbs in bloom?

The next morning, we inquired at the courts in San Luis Potosí about some of our collection points, mostly with negative results. It seems that Morales is now within the city (just around the corner from our courts) and is at present the site of a large smelter. About Las Canoas we received vague and conflicting reports, but gathered that there was no road to this little community. We were told again that the road to Charcas and Bocas was very poor, almost impassable. However, we set out to find it, thinking that we would at least see for ourselves how bad it was and perhaps try it out for a short distance. As it happened, we were given erroneous directions at the filling station and failed completely to find the cut-off leading to Bocas and Charcas, so we decided to drive out on Highway 80 as far as the spot where we had seen the “Mayitos” the evening before.

We had driven only 14 miles when I saw a large group of plants along the roadside that I was particularly anxious to photograph, a tufted liliaceous species which blooms in less than a year from seed and makes an attractive, drouth-resistant garden subject. While I was busy with my camera and Morris was gathering seed, Fred walked across the road toward a group of small trees, saying that he had a hunch that we were going to find our bulbs in partial shade. Soon, he called very nonchalantly (considering how wildly excited he must have been) that he had something to show us that we might find interesting. The “something” was unquestionably *Z. concolor*! We were thrilled beyond words and had to pinch ourselves back to reality, for it all seemed like a dream. The bulbs had bloomed heavily some two or three weeks earlier for there

were many seed capsules well on their way to maturity. Leaf growth was well advanced and it was soon apparent to us that the bulbs were present in great abundance in the immediate area, growing both in shade and full sunlight. The altitude was 7800' and our location was a narrow moisture strip which crossed the road at a slight angle. The soil was a



Fig. 7. Habitat of *Zephyranthes concolor*, 18½ mi. S. W. of San Luis Potosi; not many of these large Yuccas are left—the natives have used them for firewood. Photo by Mrs. Morris Clint (5-15-54).

light sandy loam and supported a good growth of Mesquite and Huisache trees as well as a tangle of Prickly Pear, Cholla and other cacti, *Agave* and small desert shrubs of many kinds. The inevitable *Z. longifolia* was also present in quantity.

We searched in vain for an open flower of *Z. concolor*, but had to be content with a few dried remains that we found still clinging to the

capsules. Upon examining these, our identification seemed complete, for they showed clearly a very short tube, very long style and stamens of two markedly different lengths. The stiffly erect, broad ($\frac{1}{2}$ to $\frac{3}{4}$ inch), glaucous leaves, the 3-3 $\frac{1}{2}$ inch pedicels and the extra large seed capsules completed the picture. Rejoicing over our discovery knew no bounds, but it also served to spur us on, for now we felt that we simply must see the bulbs in bloom. We reconnoitered a bit in the immediate neighborhood but found nothing more of interest. By then, it was well along toward noon and we decided to return to the city and drive south on Highway 80, then east on Highway 45, toward Leon, in the state of Guanajuato. It was a very happy and fortunate decision.

Very shortly after coming onto the plateau again (one drives through very rugged mountains for a short distance south of San Luis Potosí), I noticed my liliaceous plants in heavy drifts along the roadside. I commented on the luck they had brought us earlier in the morning and the words had barely died on my lips when I was startled to see—some distance away on the prairie—a huge, light yellow *Zephyranthes*. We had been driving rather fast, so that by the time Morris could stop the car, the flower was out of sight. There were many joking remarks and I was accused of “seeing things.” Morris turned the car around, rather dubiously but graciously enough—but Fred and I were already out and running toward the spot where I had seen the flower. We soon sighted it again on the bare ground and, even at a distance, were certain that this was at last *Z. concolor*. [Figs. 4, 5 & 6] We turned excitedly toward the road, waving our arms wildly for Morris to hurry, only to find him bouncing toward us over the prairie in the car. We all stood in awe for some time before the lone blossom, so startlingly beautiful in such incongruous surroundings. [Fig. 6] It was far more lovely than we had imagined, but we realized that no cold botanical description could ever do justice to this flower. Mixed thoughts raced through our minds—elation, gratitude, pure dumbfounded amazement at our good fortune. How had it been possible for me to see this solitary blossom, 100 yards or more away, from a fast moving automobile? True, it was quite large—2 $\frac{1}{2}$ inches or more across the open face and slightly more in length—and very full, with broad segments almost an inch across. The bulb had bloomed on little rainfall, for the reddish, sandy loam was very dry, and had sent up only the bare scape, a scant 8 inches high. The flower was a light, rich yellow with a hint of green in the color complex and was set at an angle on the stem similar to *Habranthus*. The perigone was not constricted above the short, almost non-existent tube, but flared outward somewhat abruptly, giving the flower a very unusual appearance for a *Zephyranthes*. If one could forget a little botany, here was a dainty, miniature *Amaryllis*.

The cameras worked overtime, as Fred and I photographed the flower from every conceivable angle, for we realized that we might never have this opportunity again. Morris, meanwhile, wandered around and found all kinds of interesting small flora, setting their first leaves or buds of the season—*Iris*, *Milla*, *Tradescantia*, *Oxalis* and *Allium*. Our

altimeter read 7800' and the speedometer told us that we were only 18½ miles south of the city of San Luis Potosí. The plateau here was rather barren in a pleasing way, with a few sparsely scattered desert shrubs, small cacti and an occasional tree *Yucca*, apparently *Y. australis* but not yet in bloom. Some distance away, on the edge of a slight drop in terrain, was a heavy stand of a fine, mammoth-padded *Opuntia* species. Right in the middle of one of these cactus clumps, Fred discovered a pale pink *Zephyranthes*. [See Fig. 9] After this, we were prepared for anything! A few more flowers of the pink species were found in and around the groups of Prickly Pear and a few more in leaf only were seen in open ground, so we reasoned that the species was here in some abundance.

As we finally turned south once more, all were very much on the alert for *Zephyranthes* blooms. Rain had come in a series of widely scattered showers, but there was little to guide us except the open blossoms, for the thirsty earth had quickly absorbed all moisture. Twice we stopped for false alarms, once for a yellow prickly Poppy and another time for a whole field of dark rose blossoms which proved to be the flowers of a species of Devil's Head cactus. It was Morris who finally saw the heavy stand of light pink *Zephyranthes* near the roadside, about 35 miles south of the city. [Fig. 9.] This spot was different in character from our *Z. concolor* location, being one of the small "rises"—not quite a ridge nor a hill—which are frequent on the plateau. Altitude was 8000'. The soil was a rocky, sandy loam and was well covered with the usual desert bushes, tree *Yucca*, immense specimens of Prickly Pear and clumps of *Cholla*. The *Zephyranthes* bulbs seemed to be partial to the *Cholla* and were blooming in some numbers at the base of these plants. We had noted the tendency of the bulbs in many locations to choose a similar home and thought at first that they were seeking some shade, but a likelier explanation seems to be that the collection of debris and leafmold always found around the plants or cactus gives them added moisture and food—also the plants themselves afford the bulbs some measure of protection from stray animals and the heavy washing of flooding rains.

Just a mile or so farther, we came upon more *Zephyranthes*—the locality an almost exact duplicate of our last stop, having the same rocky soil with perhaps more *Yucca* and Prickly Pear and less *Cholla*. We again found the light pink flowers and saw also a few blooms of another form, a dark rose or light red. We noted that these particular flowers had an extremely short pedicel, shorter than the light pink flowers and much shorter than those seen on the upper plateau, and laughingly wondered if we were not following the evolutionary path toward *Z. fosteri*, which was collected by Mulford Foster in the state of Jalisco, not too much farther south than our present whereabouts. This speculation still remains open, for we were soon to drive out of the shower areas.

Several solitary blossoms of *Z. concolor* were observed in the shallow bar pits along the roadside as we drove along. These occurred at in-

frequent intervals, the last one seen being just a few miles north of Ojuelos de Jalisco. We had meantime entered a heavily farmed portion of the plateau and had come to the southern limits of the rain showers, or would have perhaps seen more blossoms. The extreme dryness of the country beyond Ojuelos and the endless monotony of the empty plowed fields became depressing, so we turned back without penetrating very far into the state of Jalisco.



Fig. 8. Habitat of *Zephyranthes concolor*, 18½ mi. S. W. of San Luis Potosi, showing cacti, etc. Photo by Mrs. Morris Clint (5-15-54).

The next morning we started out full of hope and expectation, for we planned to drive through the state of Aguascalientes and as far north into the state of Zacatecas as time would permit. We reasoned that perhaps the rains had travelled westward, since they had not extended very far to the south. As we drove through the short strip of mountains just south of San Luis Potosi, we again admired the numerous speci-

mens of a blue-grey species of *Dasyilirion* which Morris and I have coveted ever since we first saw the plants two years ago. The plants were sending up tall bloom spikes and we wished there were time to look for seed left from the year before. Numerous *Hechtia* were seen in heavy patches on the rocky mountainsides and we wondered if these were the same species seen on the upper plateau, or whether they were still another species. As we passed through the foothills, Fred wondered (not for the first time) if there were not *Zephyranthes* on the hillsides and



Fig. 9. Light pink *Zephyranthes* species; about 35 mi. S. W. of San Luis Potosi; Clint #M-426; scape about 8 inches tall. Photo by Mrs. Morris Clint (5-15-54).

rather wistfully remarked that he would dearly love to see them blooming in the mountains. As if to grant his wish, we suddenly saw their bright blossoms on the lower edges of the rocky hills. There was no safe place to stop, but we fortunately found another colony just beyond, on more level but very rocky soil. As usual, the "Mayitos" were in the greatest numbers at the base of available plants—shrubs, cacti and clumps of a large and particularly vicious *Agave*. There seemed to be a bewildering assortment of forms and colors, including the light and dark pink we had seen the day before. One outstandingly beautiful flower was a large deep

rose with a white throat, a little similar to *Z. grandiflora* but differing chiefly in the shorter, more upright style. For a moment I thought that a deep red flower was identical with bulbs we had collected years ago, east of Ciudad del Maíz, but found that it had a much shorter tube and pedicel, and leaves of an entirely different character. To make things more interesting, we discovered that we were not far from Canoas, one of the very locations we had been searching for. *Z. pallida*, said to be close to *Z. lindleyana*, was collected by Pringle near Las Canoas in 1891.

As we drove south over the same territory we had covered the day before, we kept a sharp watch for stray blooms of *Z. concolor*, for Fred wanted a specimen for pressing. He had taken one of the large rose blossoms on the preceding stop and was later to press a couple of the white flowers found in the caliche outcropping north of San Luis Potosí. With no equipment but a few sheets of newspaper, our ice box for a weight, and the rising heat from the floor of the car, his dried specimens were remarkably beautiful and would have been the envy of any field botanist. History repeated itself and I again spied a lone flower some distance away on the bare prairie, but this time there were no joking comments. As we stopped, we realized that we were only a fraction of a mile beyond our discovery point of the day before. We eventually found six or eight flowers in the immediate vicinity, very widely scattered and often almost hidden from view by small shrubs. One large bulb carried two scapes with freshly opened flowers. Fred took two blossoms for pressing, choosing a large and a small one.

Shortly after turning west at Ojuelos into Highway 45, we saw signs of recent rainfall, so were not surprised to find *Z. concolor* in bloom on a gravelly hillside. There were more open blossoms than we had seen at any one time or place. Several bulbs carried two scapes, but all of the flowers were inferior. The blossoms were a lighter, more creamy yellow, with somewhat undulate segments. At first, we thought that perhaps we had found a variation, but finally decided that the flowers were a day or so old, which explained the paler color, and that the slight distortion was due to lack of moisture. It was our first glimpse of the species on other than level land and in gravelly soil, and it also definitely placed the bulbs in the state of Aguascalientes. The elevation was 8000'.

This was destined to be our last stroke of luck for the day, for the showers had not extended westward, as we had hoped, and the country was pitifully dry. We drove north from the city of Aguascalientes well into the state of Zacatecas, but found a repetition of the same dry, heavily farmed land which had caused us to turn back the day before. We were sorry not to see the bulbs in bloom near José's home town of Rincon de Romos, for we knew he would be disappointed. We looked at the hills in the distance and thought that one would find them there in abundance a little later in the season.

It still remains a mystery to us why *Z. concolor* has been so long lost to cultivation. Why has not someone seen or collected this species since the opening of paved highways through the central plateau region of Mexico? It now appears certain that the range of the species is very

extensive, covering portions of the states of San Luis Potosí, Aguascalientes, Zacatecas and Guanajuato, and perhaps extending into Jalisco, Querétaro and other states of the great central table land. It is true that the bulbs occur in abundance only in isolated colonies in many places, due to extensive farming operations, but it seems equally true that they are still to be found in small numbers along the roadsides in



Fig. 10. *Zephyranthes* species, white keeled red outside; scape about 10 inches tall; about 43 mi. N. E. San Luis Potosi; Clint #M-434. Photo Mrs. Morris Clint (5-17-54).

these same farming areas. If we had been just a week or so later, perhaps we could give a clearer picture of their full extent and abundance. In July of this same year, Morris and I located a large colony of *Z. concolor* in full and luxuriant growth in the state of Guanajuato, less than a mile west of the state line of Querétaro. We were surprised to find the soil a mellow clay loam, which would seem to indicate that the species is not too particular as to soil.

After our return from Aguascalientes, we took stock of the situation. We had accomplished our main purpose—to find *Z. concolor* in bloom—and had seen “Mayitos” in so many variations that our heads were still spinning. Our only regret was that we had failed to locate *Z. verecunda*, but we felt that the rains had been too light and too intermittent to justify further search for this species, so decided to leave for home the next morning, though we were a day ahead of schedule. Our phenomenal luck rode with us the next morning, for we again saw the white *Zephyranthes* species in bloom on the rocky strip about 45 miles north of San Luis Potosi. We were delighted with the flowers, which were some of the loveliest and most distinctive of all the “Mayitos” seen on the trip. They were well formed and graceful—pure white except for a distinct stripe of bright red down the center of the segments on the outside of the flower. [Fig. 10] No other confusing forms were to be seen. This time, we were able to take good photos, though it was still a little early in the morning for perfect color rendition.

The valley of Puerto de Lobos seemed as dry as before but a few miles farther, as we rounded a sharp curve in the mountains, we spied a few *Zephyranthes* flowers among the large boulders. Once more Fred was privileged to see *Zephyranthes* in bloom on the mountainside. They proved to be a small familiar form, much farther east than we had ever seen them, but still on the dry side of the range. As we entered the edge of the rain forest, we saw that the rain we had encountered several days before had obligingly bloomed still more flowers for us. This last gesture of Lady Luck made our trip complete, for some of these last blossoms were very close to the described type of *Z. clintiae*.



Form of *Amaryllis belladonna* L., collected 20 mi. N. E. of Santa Cruz, Bolivia, at the Hacienda Souce. Photo by Ira S. Nelson, 1954.
Plate 3

SEARCH FOR NEW **AMARYLLIS** BREEDING STOCK

IRA S. NELSON, *Professor of Horticulture*
Southwestern Louisiana Institute, Lafayette

On August 1, 1954, I began an *Amaryllis* collecting trip which led me through Panama, Colombia, Ecuador, Peru and Bolivia during the following three months. My main objective was the Bolivian *Amaryllis* species which Mrs. Donald V. Applegate had reported seeing near Santa Cruz, Bolivia. The recently organized Louisiana Society for Horticultural Research sponsored the trip as its first project. Mrs. U. B. Evans, President of this organization had already received samples of Bolivian *Amaryllis* from her daughter, Mrs. Applegate, so prospects of finding something good seemed assured.

By hedge-hopping down the South American continent, I was able to do some collecting enroute to Bolivia. Since the purpose of the trip was to bring back bulbs not already available to hybridizers, I took every opportunity to procure them whether from the wild or from cultivation.

Armed with a copy of "AMARYLLIDACEAE: THE TRIBE AMARYLLEAE" by Traub and Moldenke and an abundance of ignorance concerning how to find *Amaryllis* in South America, I landed at Panama City ready to begin my search. During the day and a half between planes I visited the botanical garden in the Canal Zone and commercial nurseries where I procured a few amaryllid bulbs.

The flight to Bogata over the lush tropical vegetation hardly prepared me for the cold arid climate of that capital city. It was here that I was really convinced that the torrid zone can be cold and that climate in it depends upon the altitude.

Dr. A. Durand, of the University of Bogata, briefed me on the *Amaryllis* of Colombia. His assistant Roberto Jaramillo went with me to La Florida, about thirty miles northwest of Bogata where we found what he tentatively identified as *A. andreana*. This has since been identified by Dr. Traub as *Brunsvigia rosea* and was therefore introduced from South Africa. It is a rather showy species of rose pink color which shades to near white in the throat. We found it growing near the mountain top on the grassy slopes exposed to full sun. The area is one of heavy rainfall and cool weather the year around. The soil consisted largely of decayed organic matter which was so completely decomposed that it was rather heavy. The altitude at this location is about 8,700 feet.

Attempts to collect *Amaryllis* in other parts of Colombia were unsuccessful. The Quito region in Ecuador likewise yielded nothing so I moved on to Lima, Peru, where Dr. Ramon Ferreyra of San Marcos University generously gave me bulbs of three unidentified species which he and others had collected. From here I flew to Cusco, Peru, and obtained two more unidentified *Amaryllis* species from Dr. Cecil Vargas of Cusco University.

While in the Cusco area I was able to procure *A. forgetii* at Lima-tambo. It had been grown there in cultivation for about 30 years.

originally coming from the nearby mountains. I was unable to find it in the wild, but was happy to get it at all. Its deep red color and contrasting snow white pistil and filaments should make it valuable to hybridizers.

After crossing the alto plena, Lake Titicaca, and more Andes, I finally arrived at Cochabamba, Bolivia. Here I was able to get 4 un-



Fig. 11. Collecting the salmon colored form of *Amaryllis belladonna* L., in the deciduous jungle 20 mi. N. W. of Santa Cruz, Bolivia. Photo Ira S. Nelson, 1954.

identified species collected by Dr. Martin Cardenas of Cochabamba University. I may have collected duplicates of some of these in the surrounding mountains but have no way of knowing until after they bloom. In addition to these I purchased 8 bulbs of *Amaryllis* from Ricardo Dillman of Cochabamba. These were not in bloom at the time but he told me that he had collected them at Chimarie in the Beni region at about 1000 feet elevation. From his general descriptions I believe one of them must be a *Sprekelia* species rather than an *Amaryllis*. Before leav-

ing Cochabamba I finally prevailed on an Indian woman to sell me bulbs of a long-trumpet sort that she was selling as cut flowers in the market.

The *Amaryllis* of the Santa Cruz, Bolivia area were the main object of the trip. Although they were not what I had expected, they were in no way disappointing. *Amaryllis belladonna* was in bloom when I arrived. [Plate 3] Variations of it in shape, size, and color certainly were as great as could be expected within any given species. I easily found *A. belladonna* growing on the sandy plain in full sun, and in recently



Fig. 12. Pale yellow form of *Amaryllis belladonna* L., collected near Santa Cruz, Bolivia. Photo Ira S. Nelson, 1954.

cleared, deciduous jungle land [Fig. 11] which was planted to crops. With more difficulty I found it amid the heavy under growth of the deciduous jungle. Pink, salmon, orange and shades of tomato red were collected. [Plate 3] All of these had white or green and white throats. With these I found a few cream whites which I feel must also be a variation of *A. belladonna*.

The most exciting find was a series of such variations resembling *A. belladonna* in most characteristics except color and color pattern. Some few of these were growing with belladonnas but most of them were

not found close to typical belladonna populations. The range of color variation extended from a cream white to pale yellow. [Plate 3 & Fig. 12] Most of them developed a pink blush after opening. Some exhibited green throats, others yellow throats. A few clones had a pink outline of a star in the throat. *The flowers of only one clone had stigmas distinctly trifid*, all others had an obscurely 3 lobed but capitate stigma.

The habitat in which this series was found growing varied from 500 to 2000 feet in elevation and from sandy open plains to accumulations of almost pure leaf mold deposited on the mountain sides. A few clones were growing in full sun; however, most of them were found growing in rather dense shade in deciduous jungle. The soil was always light and well drained. One clone of these blushing amaryllis was growing between bromalids on a small rock ledge on the side of a cliff. The roots were sparsely covered with rotting leaf mold but the bulbs were entirely exposed to the air.

Due to the day-to-day color change of these blushing *Amaryllis* I could never be sure whether I was seeing a new one or whether I was merely seeing a different color phase of one already collected. I am confident that I brought back at least a dozen that are distinctly different and there is a possibility that I have doubled or tripled that number.

The blushing *Amaryllis* from Santa Cruz justified the entire trip. They are delicate of color, graceful of form and of a size that should be useful for both garden and cut flower purposes. Certainly they are a new departure from the *Amaryllis* known in the States.

In the Santa Cruz area two additional *Amaryllis* were obtained from cultivation. One, a relatively long-trumpet sort was white with pink stripes. The other, which was also found growing wild had a medium length trumpet. It closely resembled the description of *A. pardina* except that some of its minute red dots were arranged in streaks radiating from the throat. This one was found growing on level sandy land recently cleared of deciduous jungle. [Fig. 13]

At Comarapa, Bolivia, situated at 7000 feet elevation, I collected a small *Amaryllis* which has green flowers streaked with red. It was found growing in deposits of sand and rotting leaves that had accumulated during high water in the scrub undergrowth along the banks of a mountain stream. The exposure was one of shade during the growing season and partial sun during the winter.

From an abandoned yard in a construction camp in Comarapa, I found a distinctive, medium-size *Amaryllis* which was bright red and had a white star in the throat. I was told it probably came from the mountains through which the new road had just been built. No positive information could be obtained about its origin.

On my flight home I had the good fortune to locate 3 additional *Amaryllis* in cultivation at Cuenca, Ecuador. Duplicates were obtained from an Indian woman in the market. I could not get any information concerning their origin but they were different from the others I already had. With this last acquisition I had the satisfaction of getting bulbs from every country visited.

Other plant material was collected as a secondary project to the *Amaryllis* search. It includes other amaryllids, orchids, bromeliads, foliage plants and seed of many kinds. All the material will be propagated and eventually made available through commercial sources. Meanwhile it will be channeled into research projects. Positive identification of this plant material will necessarily have to wait until sufficient study of it can be made.

The Aymara Indians call the *Amaryllis* "horra-ho-ray-chee." This of course is the phonetic spelling. I was told that before the days of modern cosmetics the Bolivian girls would rub the juice of the bulbs on their cheeks to give them color. For one night their complexion would

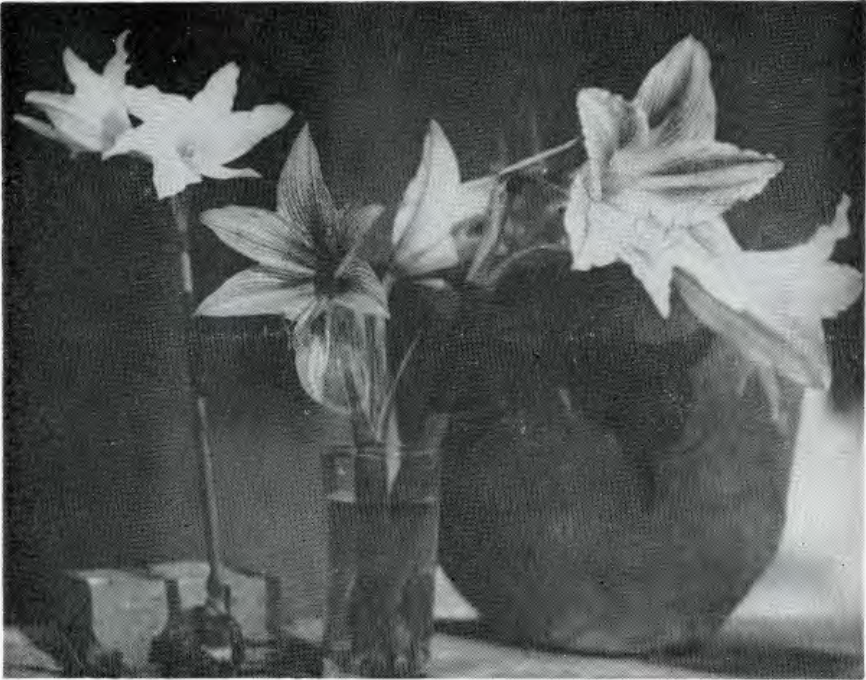


Fig. 13. Three unidentified *Amaryllis* species, from the Santa Cruz area, Bolivia. Photo Ira S. Nelson, 1954.

glow with radiant beauty. In the several days that followed, however, they would have to remain out of sight of their lovers because their cheeks would be drawn, cracked and as rough and ugly as they had been glamorous on the night the juice was applied. One of the older women summed it up by saying "thank God for Max Factor."

A total of 900 bulbs were brought back most of which were *Amaryllis*. I do not know how many of the variations are valid species, since some were not in bloom when I got them and others did not fit the descriptions I had with me. In retrospect I feel that I had more than

my share of good luck to locate so many kinds. South America is a tremendous area in which to hunt for *Amaryllis*. The problem of finding them was like finding the proverbial needle in a hay stack.

DAYLILY NOTES, 1954

HAMILTON P. TRAUB, *California*

DR. NORTON'S 'ARTEMIS' DAYLILY. The writer of this note was fortunate enough to possess a plant of Dr. Norton's 'Artemis' daylily which turned out to be the outstanding diploid daylily by far of those seen by him during the 1954 blooming season in this part of California. Since it is generally true that daylilies that can withstand the conditions here are even showier when grown in the East and Southeast, it can be predicted that 'Artemis' will surely take a leading position in future daylily lists. It is of the chastest light yellow (Aureolin RHS 3/2), and is sunfast. The setsegs are pointed and slightly twisted in the upper part, but the petsegs are oblanceolate and thus they have a completely rounded tip (apex). The arrangement of the tepalsegs is quite regular as contrasted with the usual two-sided arrangement in the ordinary daylily flower. This combination is novel and thus lifts it out of the class of the ordinary daylily flower shape. In his personal rating of daylilies it is placed at the very top for diploid clones. It would not be fair to compare it with the best of the polyploid (tetraploid) hybrids which are in a class by themselves. The best of these outdo anything so far achieved in diploids. However, among diploids, 'Artemis' is tops. In his estimation this daylily is a must for all daylily fanciers, particularly breeders. It is easily worth \$25.00 or more per plant, that is if one can get it. The demand is far below the supply, and will remain so for a long time. Dr. Norton is to be congratulated for introducing this most beautiful daylily which will give pleasure to countless gardeners for an indefinite period.

THE 'POLLYANNE CARTER' DAYLILY. This new clone, 'Pollyanne Carter' (Traub-Buck, 1954) is one of the seedlings produced by the writer and grown to flowering by Mr. E. Quinn Buck in California. It has been named for Miss Pollyanne Carter, of Massachusetts. The scape is up to 38" tall. It is of the multiflora type with up to 30 or more medium-sized flowers per scape in well established plants. The most outstanding character about this clone is the brilliantly clear buttercup yellow (RHS 5) of the flowers, so bright that they outshine the others around them. The flowers open wide, about 4½" across; setsegs are 7/8" wide; petsegs 1⅜" wide, edges slightly ruffled; fragrant; first flowers in early midseason and recurrent blooming (mid-July) in California.

THE 'WINGED VICTORY' DAYLILY. This new clone, 'Winged Victory' (Traub, 1955) is of medium height; flowers very large, petsegs a brilliant, clear lemon yellow (RHS 4/1), somewhat creped, and ruffled on the edges, and longer than the setsegs, which are a clear buttercup yellow (RHS 5/1); fragrant; early midseason, and recurrent blooming (late July and August) in California.

FLOWERING HABIT OF AMMOCHARIS

L. S. HANNIBAL, *California*

It was some ten years ago that the writer flowered *Ammocharis heterostyla* from Mount Elgon in Kenya. Neither this species nor another small pale white form were to be considered good garden material, so no tears were shed when the bulbs failed to adapt themselves to the thin sandy soil with oak leaf mulch enrichment, or to the prolonged moist spring weather which prevails here in the foot hills of the Sierra-Nevada mountains east of Sacramento. But where one species fails the larger *A. coranica* has made a striking growth. It was with considerable pleasure that we welcomed its large scarlet Nerine like blossoms—If only the bulb were not such a shy bloomer; it would be a wonderful garden plant.

In all instances when *Ammocharis* has flowered, usually in August or September, two scapes have developed from each bulb, usually within two or three weeks of each other. Mental note of this was made ten years ago when *A. heterostyla* first flowered that this was a *Crinum* characteristic, and the affinity of *Ammocharis* to *Crinum* was more apparent when it was found that the flowering buds of each arise four leaf axels apart. At least this holds true with the *Ammocharis* species that have been observed and the several *Crinum* species examined. However the genus *Crinum* is a large one so there could be variations from this periodic arrangement.

A careful search of the literature, including E. Milne-Redhead & H. G. Schweickert's lengthy report on the genus *Ammocharis* disclosed no mention of the double scape behavior. Actually this feature may be more basic than floral structure, and therefore is a distinctive divisional feature which can be used to segregate *Crinum* and *Ammocharis* into a multiple scape class, and *Nerine*, *Boophone*, *Brunsvigia* proper, and *Brunsvigia* section *Coburgia* Herbert (1819) into a single scape class. The only unknown to me of this South African tribe of *Amaryllidaceae* is *Cybistetes longifolia* (ex *Ammocharis falcata*).

This latter plant is quite rare and is confined to an area about table mountain that is now fairly well settled, so the species is rare. If *Cybistetes longifolia* does throw a single scape, as the John Martley article on Page 225 of the 1939 *Herbertia* leads one to believe, then this species may be more closely allied to *Brunsvigia rosea* (section *Coburgia* Herbert 1819) or *Nerine* than previously supposed. The separation of the scape from the basal plate, which permits it to roll away and scatter seed as in some species of the *Brunsvigia* is caused by the leaf growth which starts very soon after flowering. It is not a sound generic feature. [A common occurrence with numerous *Brunsvigia rosea* hybrids and *B. appendiculata*.]

We cannot draw many conclusions from the flowering habit in the single scape genera. *Brunsvigia rosea* (Sect. *Coburgia*) and the lorate leaved *Brunsvigia* normally produce a complement of eight or nine leaves, The lingulate leaved type *Brunsvigia* usually exhibit five; *Nerine* may

have five or six; *Boophone ciliaris* produces four leaves whereas *B. disticha* exhibits 12 to 15. All of these species must produce a full compliment of leaves if a flower bud is to be anticipated in the following fall.

AMARYLLID NOTES

HAMILTON P. TRAUB, *California*



Fig. 14. Form of *Amaryllis belladonna* L., collected by the late Dr. H. P. Pittier, of Caracas, Venezuela, in the Llanos de Araure, Acarigua, State of Portuguesa. Photo by Dr. H. P. Pittier, made in 1930's.

RANGE OF *AMARYLLIS BELLADONNA* L. In the 1930's, the late Dr. H. P. Pittier, of Caracas, Venezuela, sent a photograph (see Fig. 14) of a plant he had collected in Llanos de Araure, Acarigua, State of Portu-

gesa, "eastern foot of the Andes." This definitely extends the range of this species into Venezuela.

AMARYLLIS PRE-TREATED FOR EARLY FLOWERING. In 1954 *Herbertia*, a report was made on a bulb pre-treated by a Holland firm for early forcing. This brief note is made to bring the report up to date.

By April 28, 1954, the 8 leaves had reached a length of 36", and were very beautifully arched so as to form a plant about 26" tall, and with a spread of 49". The leaves ranged from 2½ to 3 inches wide, they are channeled on top, with a blunt apex. The plant was a wonderful show-specimen, even when not in flower, until the 1st week in August, when the leaves declined, and soon died back. At the same time, however, 4 new leaves quickly appeared. In October, 3 additional leaves were produced, and thus the plant was again a wonderful show specimen. In spite of the fact that the bulb had been forced for Christmas, it increased markedly in diameter.

It should be noted that the plant was grown continually in the same clay pot which was placed inside of a green-glazed ornamental pot. It was placed on the floor on the south side of a living room provided with floor to ceiling glass doors. The floor was provided with radiant heating from water in copper pipes, and the temperature never was allowed to go below 72° F. This appeared to be the ideal conditions for growing *Amaryllis*.

In spite of such successes with pre-treated bulbs for early forcing during the Christmas season, the Holland growers report that such bulbs are not much in demand in America. In Europe they find a ready market. It is hoped that *Amaryllis* enthusiasts in America will avail themselves of this opportunity in the next holiday season.

RECENT ADVANCES IN HEMEROCALLIS INTRODUCTIONS

PHILIP G. CORLISS, M.D.,
S. W. Reg. Vice-Pres., Somerton, Arizona

One of the most important factors in daylily breeding in recent years is the recognition by breeders and fanciers that there is a great difference in regional performance of the new hybrids. In all parts of the country, hybridizers are still working for larger flowers, new patterns and colors, resistance to fading, and longer duration of the life of the individual flowers. In addition, the breeders in the cold climates, where only a single blooming period is expected, are working for increased branching (more buds and longer bloom period) and earlier and later blooming varieties to lengthen the daylily season. In the deep south, on the other hand, there is more attention to continuous or remountant bloomers, where a scape with fewer stumps and pods is quickly followed by another with fresh flowers and buds.

In pursuit of new colors, the interest in pink, blue, black, and white continues unabated. There is a great demand for flowers with green

throats, which suggest coolness to many gardeners in the period of mid-summer heat when daylilies are at their best. [For my part I would prefer bright red throats, but such a flower has not appeared nor does it seem to be the goal of any of our breeders.]

Mrs. Nesmith has recently offered several descendants for her 'Pink Prelude' which are an improvement over earlier pinks in size, color, and refinements of form and texture. Among the best may be mentioned her 'Mayflower' and 'Her Majesty.' Mr. J. C. Stevens has some nice pinks to follow his 'Pink Damask,' and Mr. Frank Childs is offering

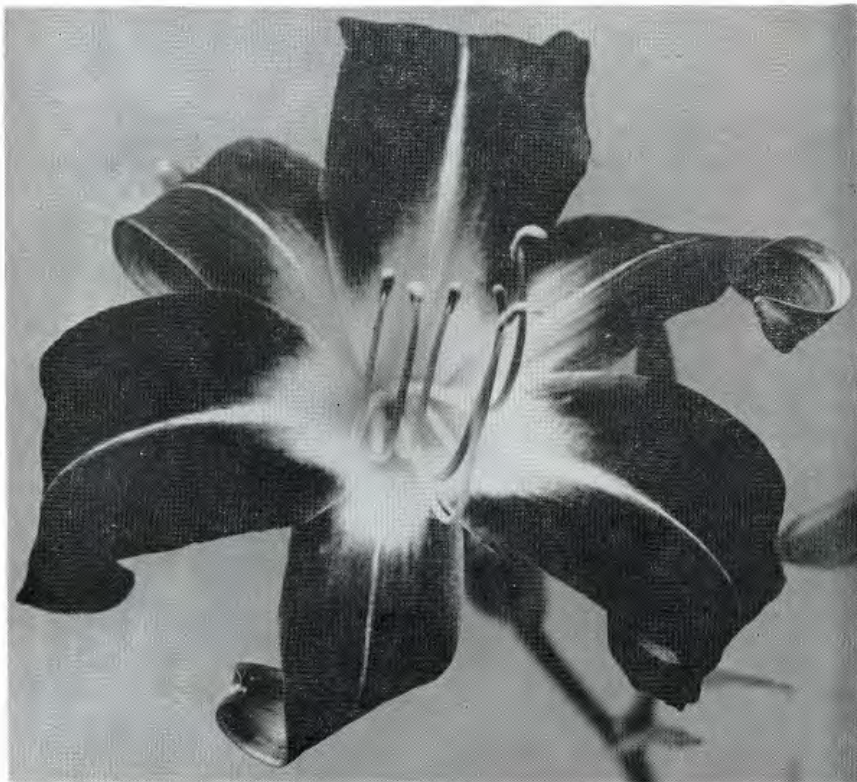


Fig. 15. Hybrid Daylily, 'Gulf Purple' originated by Mrs. Will Land of Beaumont, Texas. Photo by Dr. Philip G. Corliss.

some companion pinks to his 'Pink Dream.' Among the breeders of evergreen types in the deep south, Mrs. Bright Taylor has some vigorous pinks of colder tone than her popular 'Pink Bowknot,' and the Baton Rouge breeders will astound the daylily world with their many new pink *hemerocallis* at the 1955 meeting.

There are no real blue daylilies yet (don't be misled by some of the names!) but from Mrs. Nesmith's 'Canyon Purple' and Mr. Ralph

Wheeler's several blue-toned flower ('Amherst,' etc.) are coming some nice blue-purples. Perhaps the largest bluish flower yet seen is Mr. Hooper Connell's (Baton Rouge) 'Blue Horizon.'

Many hybridizers are getting very dark daylilies. Mrs. Bright Taylor's 'Royal Envoy' and Mrs. Robert Schlumpf's (Houston) 'Black Knight' are examples of the best new "black" hems, and from a new-

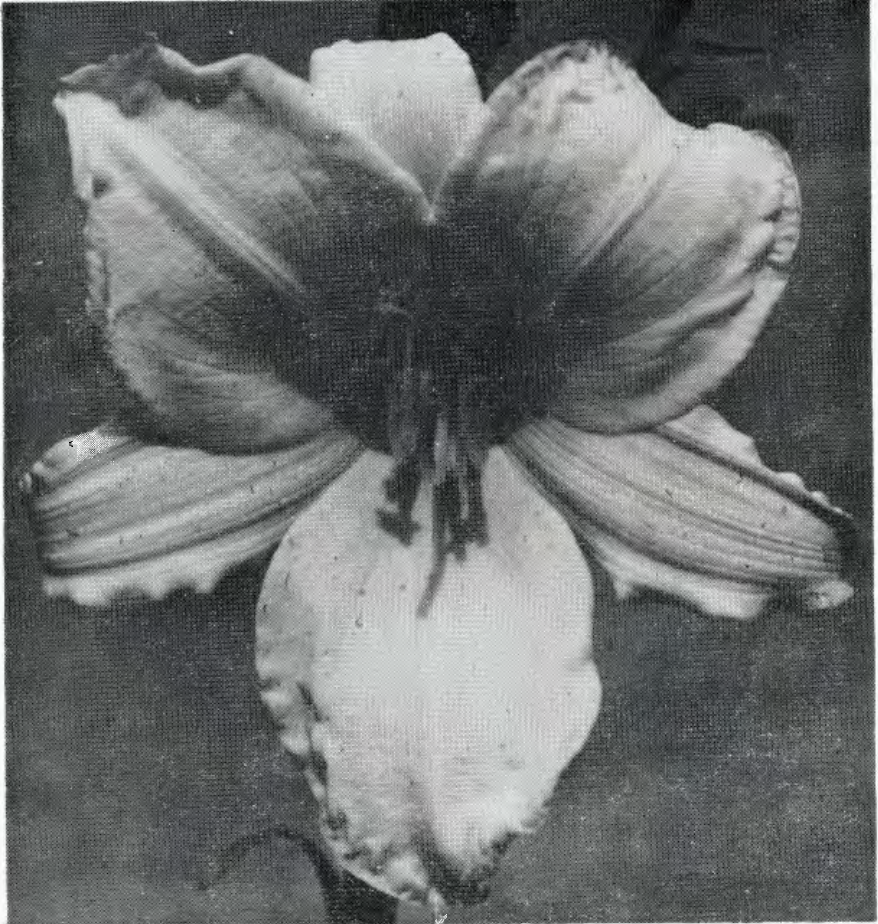


Fig. 16. Hybrid Daylily, 'Moonlight Tryst' originated by Tom Craig. Photo by Dr. Philip G. Corliss.

comer, Mrs. Will Land of Beaumont, Texas, we have 'Royal Mantle' and 'Gulf Purple.' (Fig. 15) Mr. Henry Sass's 'Convoy' is one of the best dark hems now available in good supply.

To date the closest approach to white is seen in the pale yellow daylilies. Mrs. Nesmith's 'Carved Ivory' was a great stimulus to breed-

ers. The late Mrs. William Bach of Bloomington, Illinois, was a couple of generations ahead of most hybridizers with her 'Snowy Egret' which is now joined by the much lighter 'White Orchid,' 'Gracie Lanore,' 'White Elf,' 'White Triangle,' 'Blanch Lafitte,' and 'White Tower.'

The "green throats" are crowding the field of newcomers. The sight of the late Mr. Joseph House's 'Green Goddess' caused much interest in the green throats' but Mrs. J. F. Emigholz's 'Cool Waters' had been a favorite with all who knew it for some time. This last-named breeder is adding to her list this year 'Green Chalice' and 'Chamois Glow' which intrigued me as seedlings the year I named her big spider, 'Oliver Twist.' Among the host of excellent new varieties with striking green throats are Mrs. A. S. Gates' (Baton Rouge) 'Summer Orchid,' Mrs. Will Land's 'Gulf Sunshine,' and Mr. Tom Craig's 'Moonlight Tryst' (Fig. 16.).

REGISTRATION OF NEW AMARYLLID CLONES

Registrars: Dr. J. B. S. Norton and Prof. W. R. Ballard

This information is published to avoid duplication of names, and to provide a space for recording brief descriptions of new Amaryllid clones. Names should be as short as possible—one word is sufficient. It is suggested that in no case should more than two words be used. *The descriptions must be prepared in the form as shown in the entries below, and must be typewritten and doubled-spaced.* The descriptive terms used should be in harmony with those given in the "Descriptive Catalog of Hemerocallis Clones, 1893-1948" by Norton, Stuntz and Ballard.

There is close liaison between the AMERICAN PLANT LIFE SOCIETY and the HEMEROCALLIS SOCIETY regarding the registration of new *xHemerocallis* clones. By cooperative arrangement with the HEMEROCALLIS SOCIETY, beginning with the 1951 HERBERTIA edition, descriptions of only such *xHemerocallis* clones for which the registration fee has been paid to Registrar, Mr. Harry I. Tuggle, P. O. Box 1108, Martinsville, Va., will be registered, and numbered (example: 3322-R). The number "3322" indicating the number of the clone and the "R," the information that it is registered. The registration fee is required *only* in the case of *xHemerocallis* clones, and *not* for other amaryllids which are registered free of charge by the AMERICAN PLANT LIFE SOCIETY. It should be noted that in a free country such as ours, registration is *entirely voluntary*, and does not replace the right of anyone to publish names with descriptions in recognized publication media elsewhere and thus obtain priority under the generally recognized INTERNATIONAL CODE OF BOTANICAL NOMENCLATURE and the INTERNATIONAL CODE OF NOMENCLATURE FOR CULTIVATED PLANTS (1953) which cover all plant names.

Correspondence regarding new amaryllid clones, including *Hemerocallis*, to appear in HERBERTIA should be addressed to Prof. J. B. S. Norton, 4922 40th Place, Hyattsville, Maryland, *enclosing self-addressed, stamped envelope, if reply is expected.*

For obvious reasons, there is a limit to the number of descriptions included from any one member in any one issue. Not more than five brief descriptions of clones under each generic heading will be published from any one member in any one issue of HERBERTIA. Descriptions of clones in excess of five brief descriptions, up to a total of 25, will be entered if the space required for each is limited to one line. In this case use should be made of the standard abbreviations already mentioned.

THE AMERICAN PLANT LIFE SOCIETY numbers the clones known to be published, including those registered and not registered, in various publication media. It is thus an easy matter to report the approximate number of named clones as of any date. Such a report will be made as of July 1 in each year. On July 1, 1954, a total of 4791 hybrid *Hemerocallis* clones had been named.

HYBRID BRUNSVIGIA CLONES

Introduced by Mr. L. S. Hannibal, Fair Oaks, Calif.

Brunsvigia rosea clone 'Picotee,' L. S. Hannibal, *cl. nov.*: A hybrid obtained by pollinating *B. multiflora* clone 'Hathor' (an H. B. Bradley seedling registered with the R. H. S. of New South Wales in 1911) with *Brunsvigia rosea* clone 'Frank Leach.' The 'Hathor' parentage contributed the wide ruffled petals and numerous blossoms. The 'Frank Leach' pollen parent also contributed to the ruffled effect, a slight *varabilis* effect where the shade of the blossoms deepens with age, a pronounced recurving of the petals, and last but far from least a pronounced tendency for the color to concentrate along the margins of the tepalsegs. This picotee effect has appeared in about 1% of the seedlings wherein the clone 'Frank Leach' has been used, but the combination with glistening ruffled tepalsegs is particularly outstanding.

Brunsvigia rosea clone 'Red Shadow,' L. S. Hannibal, *cl. nov.* The parents used were a *B. rosea bicolor* and 'Hathor' (described above). The blossoms are similar in shape to *B. rosea major*, our well known west coast form, but the trumpet is pure white whereas the limb is a brilliant red (RHS Rose Red 724/3). The plant makes a striking show in the garden.

Brunsvigia Multiflora clone 'Glory,' Allister Clarke, *Cl. nov.* This fine Australian *B. multiflora* hybrid bears numerous large blossoms with oddly twisted petals. The tube of each flower is saffron yellow, turning orange in the throat where the rose and yellow shades blend. The margins of the tepalsegs are of a lighter shade than the mid area. The color combinations and flower shape suggest an orchid. Up to 39 blossom have been observed on a single scape. This striking plant came from a series of crosses made by Allister Clarke about a decade back.

HYBRID AMARYLLIS CLONE

Introduced by Mrs. Isabelle Parker, 424 Crawford, Biloxi, Miss.—

'Faith'. Flower delicate, white with about $\frac{1}{8}$ inch border of red; flower about 8 inches in diam.; segs 5 inches long, reflexed; petsegs 3 inches, setsegs 2 inches wide; 2 blooms per scape; spring flowering.

HYBRID HEMEROCALLIS CLONES

Introduced by Stanley E. Saxton, Saratoga Springs, New York:

'Aflutter'. Flowers large, light purple and yellow bicolor; scape 38"; late midseason; evergreen.

'Island Song'. Flowers 6" to 7" flowers, opening flat; creamy-ivory, washed and streaked rose-pink, deeper at mid-petalseg; fading to cream at edge; setepalsegs less rose-washed than petepalsegs; scapes 30"; mid-season; semi-evergreen.

'Kriss Kringle'. Pure, deep, velvety red, greenish-yellow at throat; star shaped flower; scape 42"; midseason to late; deciduous.

'Magic Morn'. Tepalsegs wide, shining rose-red self; fine growing habit; fuller in effect than others in same color class, throat golden yellow; scape 40"; midseason to late; semi-evergreen.

'Premium'. Very large, bright, coppery-gold flowers with cream midrib; petepalsegs 2" wide; flower 6" to 7" in spread; scape 46"; blooms over long season.

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.]

Brodiaea spagazzinii Macloskie. Thanks to the kindness of Dr. Alberto Castellanos, of Buenos Aires, we are able to present here a resumé of a curious nomenclatural mix-up involving several amaryllidaceous plants and plant names.

In 1897 Carlos Spegazzini proposed the binomial *Brodiaea patagonica* Speg., for an amaryllidaceous plant represented by and typified by his collection no. 362. In the same paper he proposed the binomial *Luzula patagonica* Speg., for a juncaeous plant typified by his collection no. 366.

Unknown to Spegazzini, however, Baker had proposed a *Brodiaea patagonica* (Baker) Baker in 1896. Spegazzini's name, therefore, was plainly a later and invalid homonym.

In 1902 Spegazzini proposed the binomial *Tritelaia patagonica* (Speg.) Speg., which he intended as a new combination for his *Brodiaea patagonica* of 1897. Unfortunately, however, he cited his no. 366 when he made the transfer (instead of no. 362).

Macloksie in his large work, "Flora patagonica" (1903-1906), recognized that Spegazzini's *Brodiaea patagonica* is a homonym, and so he re-named it *Brodiaea spegazzini* Maclos. However, he was misled by the citation of the wrong specimen in the *Triteleia patagonica* transfer and so assumed that Spegazzini was intending this as a new combination for his previous *Luzula patagonica*, based on that collection number. Macloskie, therefore, proposed for this supposedly second plant the name *Brodiaea luzula* Maclos.

Hauman in Physis 3: 423—426. 1917, clarifies this situation and shows that Macloskie's binomial, *Brodiaea luzula*, is clearly based on an error and is to be reduced to the synonymy under *B. spegazzinii* Maclos.

Spegazzini himself in Physis 3: 265. 1917, changes his *Triteleia patagonica* var. *angustiloba* Speg., to *Brodiaea spegazzinii* var. *angustiloba* (Speg.) Speg.

[PLANT LIFE LIBRARY, continued from page 137.]

THE AMERICAN GARDENER'S BOOK OF BULBS, by T. H. Everett. Random House. New York. 1954. pp. 226. Illus. \$5.95.

This profusely illustrated popular book on ornamental plants having true bulbs, corms, tubers, rhizomes or thickened storage roots is designed to provide information "on the selection and uses of "bulbs" in gardens, as well as instruction on how to grow them." The second part of the book is in the nature of an alphabetical cyclopedia of bulb gardening.

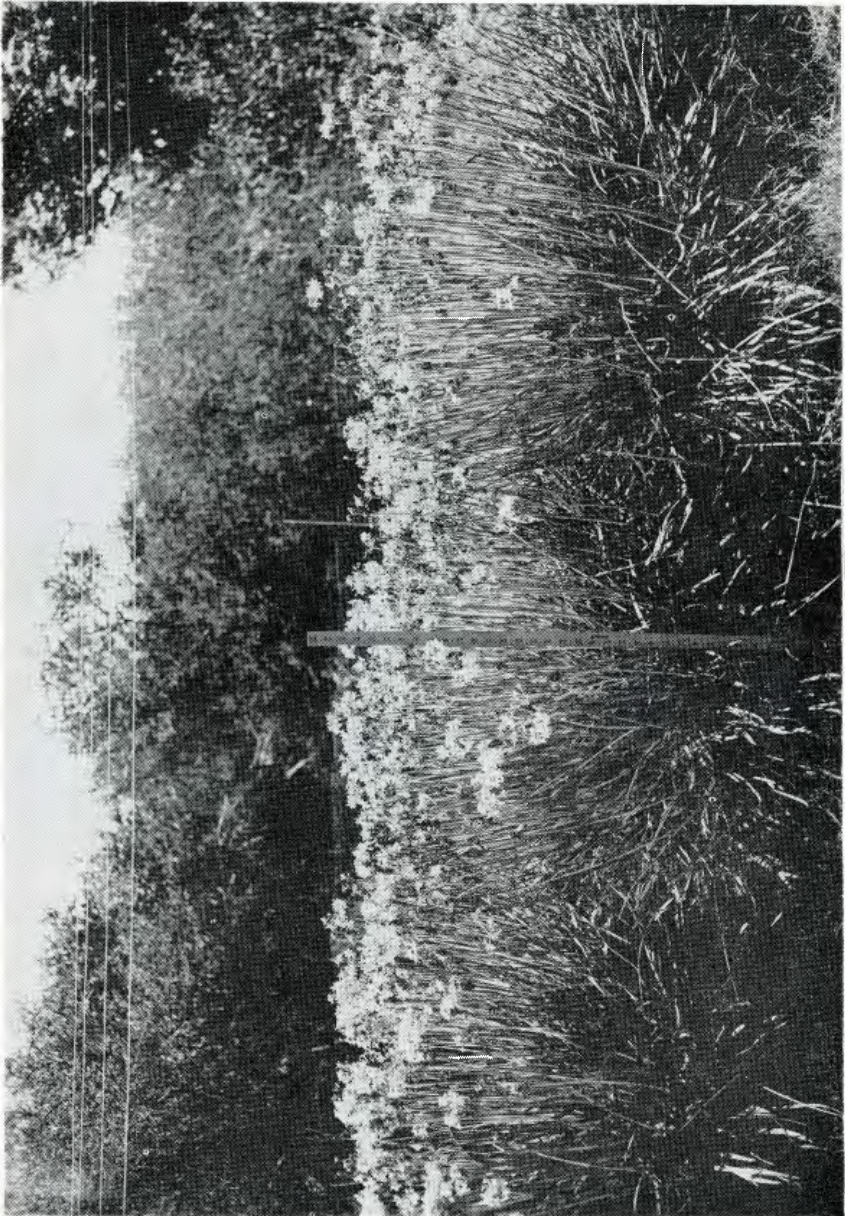
PRINCIPLES OF GENERAL ECOLOGY, by A. M. Woodbury. Blakiston Co., 575 Madison Av., New York. 1954. pp. 503. \$6.00.

This stimulating new book "is designed as a college text of general ecology at the upper division level. It may be of interest to other workers in the field and also the layman . . . It may be of special interest to research workers in many fields and to workers in applied fields such as forestry, agriculture, wildlife, limnology, oceanography, and others because it outlines a large field into which such activities fall." The material is presented in three parts (1) general considerations, (2) physical environment, and (3) biotic interrelationships. The illustrations are particularly outstanding. This is a most valuable, easily readable book on ecology which is indispensable to those interested in the subject.

BASIC BOTANY, by Fred W. Emerson. 2nd ed. Blakiston Co., 575 Madison Av., New York. 1954. pp. 425. Illus. \$5.00.

This second edition of a standard text has been written like the first from a unified view showing the functions of the plant as "phases of a single unit. This unit is protoplasm, the activities of which constitute what we call life. The various differences in physicochemical organization, and both structure and functioning are controlled by genes, influenced by environment." In this revision, greater stress has been placed upon applications to farm and garden with reference to growth

[PLANT LIFE LIBRARY, continued on page 80.]



Tulbaghia violacea in flower in Southern California. The meter stick indicates that each of the three clumps is at least $\frac{3}{4}$ m. high.
Plate 4

3. GENETICS AND BREEDING

TULBAGHIA VIOLACEA—DESCRIPTION, CULTURAL AND CYTOLOGICAL OBSERVATIONS

THOMAS W. WHITAKER, *California*
and WALTER S. FLORY, JR., *Virginia*

Tulbaghia violacea Harv. is indigenous to Cape Province, South Africa. Hutchinson (1934) places the genus in the Amaryllidaceae, Tribe Agapantheae. Stenar (1933) has made an embryological study of *T. violacea*, and has found that the embryo sac follows the Scilla-Type of development. The ovules are hemitropous, without chalazal outgrowths; there is no covering cell over the embryo sac cell, and the pollen develops by successive delimitation. The chromosome number is given as $n = \text{ca. } 6-8$.

Tulbaghia violacea is an elegant garden plant for many locations in Southern California [Plate 4]. We have been unable to find it adequately described under cultivation. For these reasons, we are recording a full description of the plants, and some cultural observations, along with a brief cytological note. The cytological data may be helpful to future investigators concerned with taxonomic studies of this group.

The slender, erect rhizomatous plants have leaves up to 45 cm long. The scapes may reach a height of almost 1 m in well grown plants. The long, narrow strap-shaped leaves are canaliculate at the base and about 1 cm in width. The umbel of 17 to 18 flowers is enclosed in two spatheous bracts, the longer one partially enclosing the shorter. The long bract is 28 to 32 mm in length, the shorter one 22 to 25 mm. The urn-shaped, lilac colored flowers are on slender pedicels 14 to 21 mm long. The corolla is imbricated in the bud, the three segments without scales overlapping the three segments with scales. The three scales form a definite corona, and are usually forked at the apex. The six anthers are attached directly to the tube (dorsifixed) at two different levels; the three upper anthers are attached to the segments with scales, the three lower ones are attached to the scaleless segments. The length of the tube (12 to 14 mm) is about equal to the length of the segments (11 to 12 mm),

The fruit is a capsule, with three locules. Each locule contains from 7 to 9 ovules, but under our conditions only one or, at the most, two ovules produce mature seed. As a rule one locule is completely sterile, the other two locules produce from one to two seeds each. The seeds are jet black, 8 mm long by 3 mm wide.

CULTURAL OBSERVATIONS

The plants do well in full sun, in light, porous well drained soil. While they do not require much moisture to barely exist, they respond very nicely to regular irrigations during the dry summer and fall months. The application of a complete fertilizer at least once a year will

maintain the clumps in flowering condition almost continuously except during the winter season. For best growth the clumps should be thinned periodically.

As a garden subject, *T. violacea* has several good points; (1) the seeds germinate readily without the use of special techniques; (2) the plants increase vegetatively, rather rapidly; (3) the plants are easily adapted to pot culture, hence can be used for decorative purposes in patios, on verandahs, or in lathhouses and greenhouses.

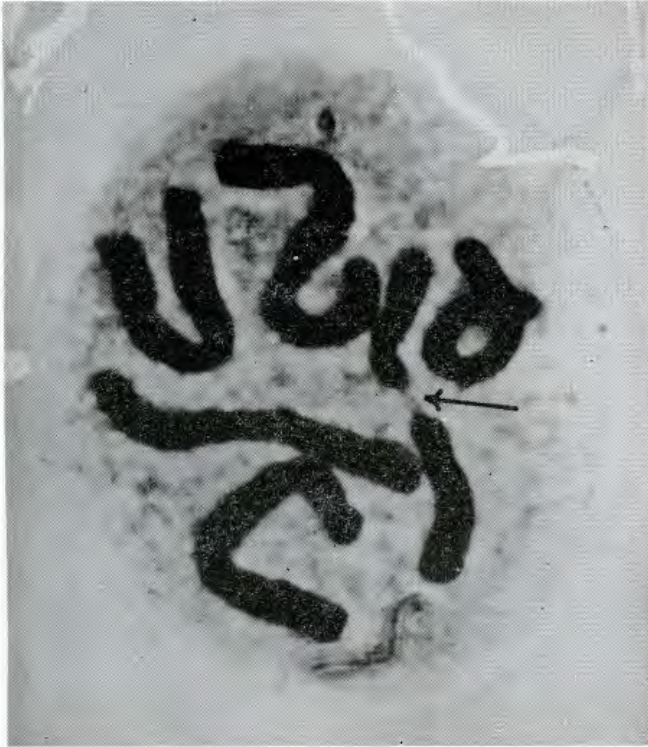


Fig. 17. Pollen grain of *Tulbaghia violacea*, showing six chromosomes. Arrow shows large euchromatic block in centromere region on one chromosome. (X2500)

In Southern California, *T. violacea* can be grown the year around out-of-doors. Likewise, it can probably be treated in the same manner in most of the Southern States where there is adequate summer rainfall and good soil drainage.

Over a period of five years, our plants have been exceptionally free of insects, plant diseases and other pests. For many people, the most objectionable feature of *T. violacea* may be the mild "garlic" odor emitted by the plants. However, the masses of bright lilac flowers, and glossy green foliage more than compensate for this defect.

CYTOLOGICAL OBSERVATIONS

Tulbaghia violacea has six pairs of chromosomes, of about equal length, and with median centromeres (Fig. 17). The distinguishing feature of the chromosome complement is the pair characterized by a relatively large block of euchromatin adjacent to the centromere in each arm of the chromosome.

Examination of root tip cells of *Tulbaghia fragrans* Ver. and *T. cepacea* Linn. each with $2n = 12$, indicates that these species have a chromosome pair that corresponds to the "euchromatic" pair described for *T. violacea*. In both species there are four pairs of chromosomes with median, one pair with submedian, and a sixth pair with sub-terminal centromeres.

The "euchromatic" pair of chromosomes characteristic of all three species suggests that differentiation of the chromosome complement may have generic significance in taxonomic studies of this group. Bailey (1954) in studies of the chromosome morphology of *Trillium* species finds a similar euchromatic region in the B chromosome of *T. undulatum*, or as he terms it, "a non-staining segment of reduced diameter." He suggests that the centromere acts as a region of differential reactivity which is usually associated with chromosomes exposed to cold treatment.

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SEED COLOR INHERITANCE AND BREEDING PATTERNS IN **BRUNSVIGIA** x **MULTIFLORA** HYBRIDS

L. S. HANNIBAL, *California*

The *Brunsvigia* x *multiflora* group of hybrids were first listed in the nursery catalogues of John Baptist and Sons as *Brunsvigia multiflora alba*, *B. multiflora pallida*, and *B. multiflora rosea*, 1865 to 1880. These latinized names have likewise been used in the horticultural reports and gardening articles issued by the Sydney branch of the Horticultural Society of New South Wales. In keeping with the 1953 rules of nomenclature for cultivated plants and the recommendations on page 3 of the January 1955 R. H. S. John Baptist's cultivar name is modified as indicated above. *Brunsvigia* x *multiflora* is an invalid name according to the rules because there is the earlier *B. multiflora* Ait., but for the

present, the former will be used since the "x" will be sufficient to avoid confusing the two.

The taxonomic features which set this particular group of hybrids apart from *Brunsvigia rosea* are the blunt glaucous leaves, which are well sheathed in a pronounced pseudo stem, the radial arrangement of the individual flowers on the umbel, the numerous flowers (up to 30 or more), the slight declination of the filaments, and the late flowering habit. Excluding the pseudo stem *Brunsvigia x parkeri*, an allied hybrid, which displays none of these features.

The G. K. Cowlshaw report on the Australian *Brunsvigia x multiflora* group of hybrids, which was published in the 1935 *Herbertia* did much toward stimulating an interest in these attractive bulbs. Since that date a score of individuals have imported these plants and there have been a variety of breeding experiments undertaken with varying results. The writer's interest dates from 1940 after observing the white flowered forms at Mr. Orpets nursery in Santa Barbara.

Mr. E. O. Orpet first reported (*HERBERTIA* 10: 124-126, 1943) that a portion of the seed obtained from these hybrids was devoid of the usual rose colored pigmentation. Experiments established the fact that such "alba" seed produced pigment free seedlings. Since it was already known that the seeds of the white flowered clones were pigment free, a means was available to isolate white flowering plants without going to the trouble of growing excess colored (pigmented) seedlings. Mr. Orpet and the writer have resorted for years to seed sorting to isolate the white flowering stock. With the exception of a few colored seedlings derived from the *B. x multiflora* 'Hathor' this sorting process has been an efficient means of differentiating between dominant colored and recessive white seedling phenotypes.

If we follow standard practice and use the letter *R* to designate a dominant red pigmentation in the albuminous flesh to the seed, and *r* to denote the absence of such pigmentation, we can then set up three possible combinations governing the coloring of flowers in the *B x multiflora* group, namely:

RR, A red genotype.

Rr, A red phenotype, capable of producing theoretically a yield of 25% white plants when selfed, or 50% white when crossed with the following *rr* genotype.

rr, A white genotype, being pigment free.

The typical *B. x multiflora alba*, which displays the most *Eubrunsvigia* characteristics of all the hybrids obviously is of the *rr* composition, and with reservations the same applies to the hybrid 'Hathor'. *B. x multiflora pallida* and *B. x multiflora rosea* are of the *Rr* composition, but one runs into difficulties selecting a typical *RR* hybrid since such clones contain sufficient *Brunsvigia rosea* genes to mask most of the *Eubrunsvigia* features. One of the major difficulties in working with these plants is to be able to recognize a hybrid when the hybrid features are completely masked by *B. rosea*. This masking not only applies to the possible *RR* type of *B. x multiflora hybrids*, but makes it practically

impossible to distinguish *B. x parkeri* from a colorful *B. rosea*. There are no clear cut *Eubrunsvigia* features in the 'Lady Parker' hybrid.

Pigmentation is not the only noticeable factor appearing amongst the seed. The seed shapes and sizes are modified considerably by the albuminous content. This varies widely with different parentages, and to some extent smaller seed, particularly if spherical in shape, denote *Eubrunsvigia* characteristics. The most interesting example is the small spotted seed obtained from the hybrid 'Hathor'. By using either *RR* or *rr* pollen types we know from pigmentation, or respectively lack of pigmentation, that we have sexual seed. However, irrespective of the parentage, which includes selfing, the general magnitude of spotting remains unaltered. The condition is strictly a maternal epidermal factor and only appears in those seeds having little or no albumen. With the one exception of *B. rosea* var. *pallida*, the condition is not transmitted by pollen to other clones.

Attention is called to the very limited number of *B. x multiflora* types which appeared in Australia between the years 1860 and 1911 (when 'Hathor' was introduced). If we were dealing with a simple hybrid there should be a wide range of segregates, but variants amongst the *B. x multiflora alba* seedlings are practically nil. The white recessives from those with an *Rr* composition disclose slightly more diversification, but the actual *breaks* in flower shape and size are obtained from 'Hathor'. Such fixed features amongst the "*alba*" hybrids indicates rather definitely that *B. x multiflora alba* is a homozygous structural hybrid.

The breeding pattern of both *B. x multiflora rosea* and 'Hathor' indicates the presence of the structural entity of *B. x multiflora alba* in many of the resulting *alba* seedlings. *B. x multiflora alba* x *B. rosea* seedlings when selfed yield less than 1% *alba* seed. This F-2 *alba* generation is quite distinct from the typical *B. x multiflora alba* type.

The writer has used *B. x parkeri* in a number of crosses. Neither selfing, nor crossing with *B. rosea major* have given any outstanding seedlings. Those with *B. rosea* var. *pallida (minor)* have been quite distinct in foliage and floral shape, but the interesting results have appeared in those few crosses that took with the *B. x multiflora* group. The Parker hybrid is of Australian origin and may be from J. C. Bidwell's stock, but the breeding patterns of the *B. x multiflora* and *B. x parkeri* are quite distinct. One does not obtain *Eubrunsvigia* throwbacks when selfing *B. x parkeri*, and in crossing with the *B. x multiflora* one runs into a number of unpredictable seed types and lethal combinations. The seedlings from these combinations result in exceptionally broad petal *B. rosea* types, or as a distinct contrast, a colorful eight flowered *Eubrunsvigia* throwback which defies correlation to *B. josephinae*. For diversity of form, and for intensity of colors which includes the copper bronzes, this last hybrid group gives promise of something distinctly new in breeding *Brunsvigia*.

BREEDING PATTERNS OF *Brunsvigia* × *multiflora* CLONES

The following tabulation is a summary of observations made since 1942 covering hybridization with the *B. x multiflora* group. Only those clones in general circulation are listed. Details on seed pigmentation and size are indicated in key crosses. Reference is made to the accompanying plates nos. 5, 6 & 7.

1. *B. x multiflora alba* seed parent (*rr*. composition):

(a) Selfing produces medium sized angular seed, all pigment free (see Plate 5, right). Seedling plants have been similar to the parent.

(b) Pollinated with colored *B. rosea* varieties: A few colored hybrid seed developed plus 80-90% alba seed which appears to be from parthenogenetic sources. The colored seed yielded intermediate hybrids whereas alba gave typical *B. x m. alba*.

(c) Pollinated by 'Hathor': All seed pigment free. No spotting factor noted. Occasional clones obtained having blossoms with wider tepalsegs.

(d) Pollinated by *Crinum moorei*: Occasional *xCrinodonna* seed produced but very difficult to raise.

2. *B. x multiflora rosea* seed parent (*Rr* composition):

(a) Selfing gives a fair yield of mixed white, pale pink and rose seed. A 1:2:1 ratio is anticipated but incompatibilities invariably modify the ratio to less than 21% alba seed. No outstanding mature plants obtained, either colored or white.

(b) Pollinated by *B. x multiflora alba*: Out of 375 seed 51.3% were rose, the remainder white (See Plate 5, left).

(c) Pollinated by *B. rosea* forms: All seed colored (see plate 6, left). Seedlings often richly colored. Compare with *Brunsvigia rosea*, (Lam.) Hann. selfed, Plate 6, right.

(d) Pollinated by 'Hathor': out of 694 seed, 305 red, 38 very pale pink, 341 white seed.

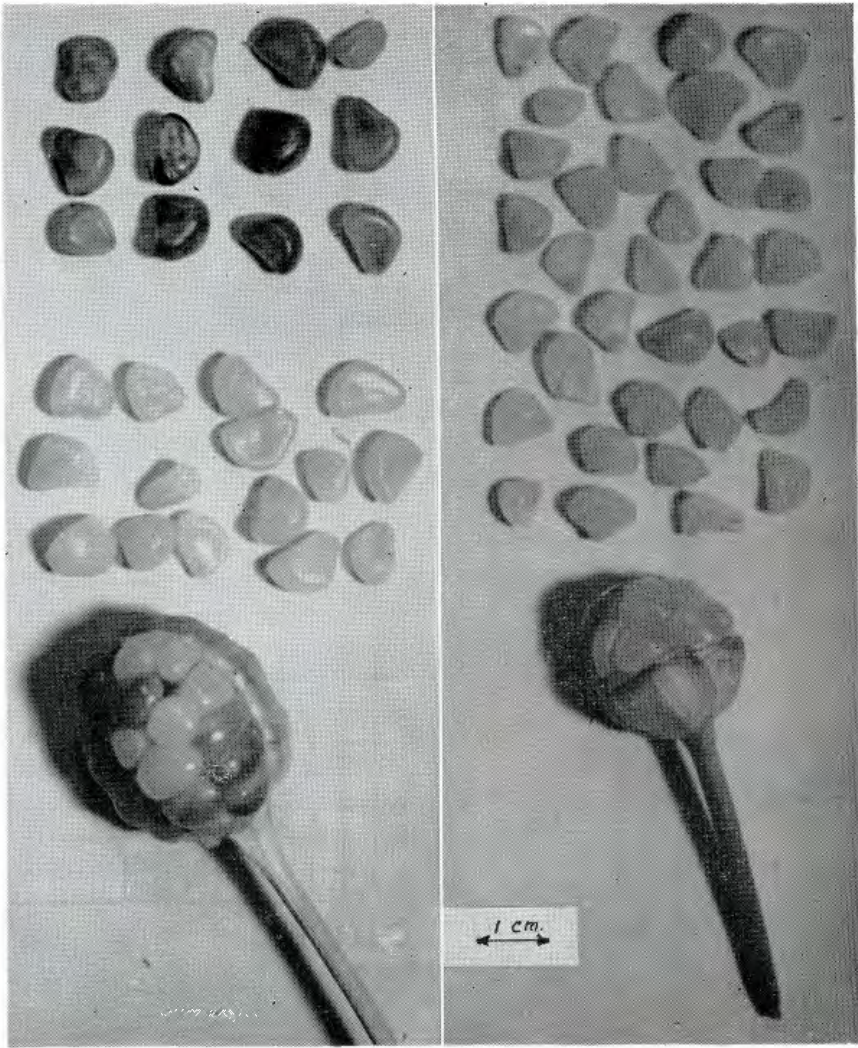
3. *B. x multiflora* 'Hathor' as seed parent (*rr* composition):

(a) Selfs with considerable difficulty unless temperature and humidity are favorable. Fine rust spots tend to pigment surface on all smaller seed. (See Plate 7, left) The following ratios were obtained:

	Year: 1945:	1948:	1953:
Large white seed, unspotted	16	79	55
Medium white, some rust spots	34	93	57
Small spherical seed, well spotted	16	75	12
(b) Pollinated by <i>B. x parkeri</i> :			
Large albuminous unspotted seed	10 dk. rose	0	0
Large albuminous lightly spotted	40 dk. rose	24 lt. r.	2 alba
Medium well spotted seed*	23 dk. rose	46 lt. r.	7 alba
Small, heavily spotted seed**	0	0	38 alba

(* Source of 'Sunset' hybrids,

** Probably parthenogenetic)



Seeds of *Brunsvigia* hybrids: (left), *Brunsvigia* x *multiflora rosea* pollinated by *B. multiflora alba*, showing a 12 to 15, or 1;1 ratio of red (*Rr* genotype) and white (*rr* genotype) seeds;

(right), *Brunsvigia* x *multiflora alba* selfed, showing all recessive white (*rr* genotype) seeds. Note scale.

Plate 5



Brunsvigia seeds: (left), **Brunsvigia x multiflora rosea** clone (composition Rr) pollinated by **Brunsvigia rosea** (Lam.) Hann. The small seeds are without pigment, and these may be of parthenogenetic origin. In many cases the **Brunsvigia x multiflora alba** clones show lowered fertility; here this factor probably contributed to formation of small seeds;

(right), examples showing typical seeds of **Brunsvigia rosea** var. **major** at bottom; and **Brunsvigia rosea** var. **bicolor**, above. Note scale.
Plate 6

Year: 1948: 1953:

(c) Pollinated by *B. rosea* clone
'Frank Leach' (see Plate 7, right):

Large rose colored albuminous seed	70
Medium sized light rose seed	84
Small spherical seed, heavily spotted, clear	68

The first two types threw light pale pink blossoms, 8% were selected as outstanding. The small seeds in most instances damp off. Lack of pigmentation suggests parthenogenesis.

(d) Pollinated by *B. x multiflora alba* (A difficult cross):

Large or medium clear white unspotted seed	25	25
Large or medium clear white, partly spotted seed	65	
Medium white, angular, heavily spotted seed	32	
Small white, spherical, heavily spotted seed*	31	

(* Probably parthenogenetic.)

(e) Pollinated by *B. x multiflora rosea*: This cross gave high seed yields. No seed counts were made. Both colored and alba seed were obtained with spotting evident in either.

4. *B. x parkeri* as seed parent:

(a) Pollinated by 'Hathor'. This cross produced a 70% yield of relative small angular seed that were only lightly pigmented. At the time the seed crop was assumed to be parthenogenetic and only a portion was grown. Numerous seedlings with broad tepalsegs were obtained, but were not as striking as the reverse cross. These small seed are not uncommon to other recently developed Australian hybrids, such as 'Glory'.

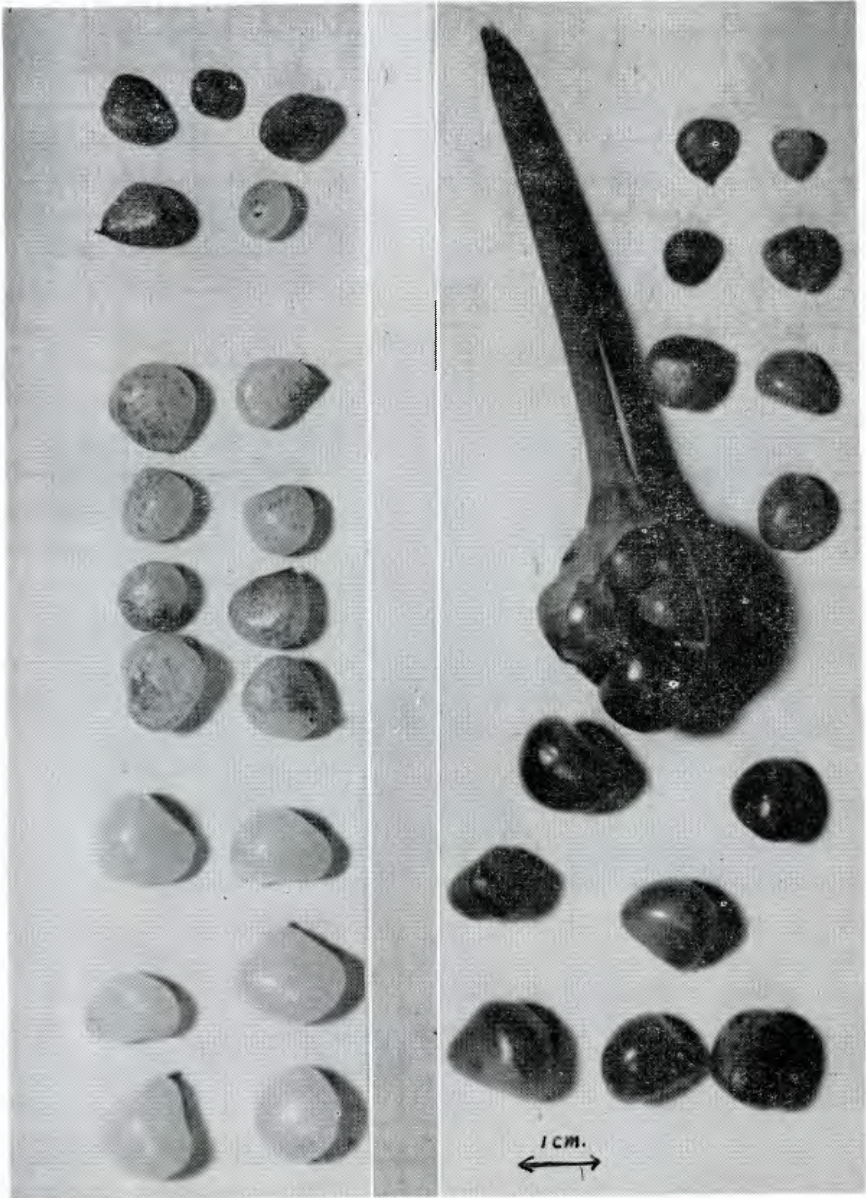
(b) Pollinated by *B. rosea* var. *pallida*: This cross gave an excellent yield of large seed. Narrow foliage of the pollen parent dominant. Plants flower with unusual variable color characteristics ranging from near white to wine red depending upon temperature conditions at time of flowering.

5. *B. rosea* var. *pallida* (syn. *minor*): This homozygous variant, which is quite small, often produces large flowered hybrids with the above described clones. The 'Hathor' spotting factor has been noted when 'Hathor' pollen is used.

6. *B. rosea* 'Frank Leach': This is an intraspecific hybrid of unknown source previous to 1890. The "picotee" pattern carried in the pollen phase has shown up in a number of *B. x multiflora* and *B. rosea* crosses. Female gametes apparently fail to pass on the "picotee" pattern.

Conclusions

Pigmentation of the *Brunsvigia x multiflora* seed is a dominant factor. Non pigmentation is recessive. The presence or absence of pigmentation in the seed is a means of segregating phenotype plants before germination, since seedling plants conform to the seed patterns. The



Seeds of *Brunsvigia* hybrids: (left), *Brunsvigia* x *multiflora* clone 'Hathor' selfed. Note six large clear white seeds at bottom, and above these, the increase in spotting intensity;

(right), *Brunsvigia* x *multiflora* clone 'Hathor' pollinated by a red parent clone of same hybrid type. Note seven clear rose (*Rr* genotype) seeds at bottom; and above these, seven spotted seeds, which may have originated from maternal tissue.

Plate 7

color patterns comply in the main to Mendelian laws, but minor deviations occur due to lethal factors, parthenogenesis, and other incompatibilities. The spotting factor associated with the small seed from the hybrid 'Hathor' does not follow the Mendelian ratios, being strictly associated with seed size. Being entirely an epidermal condition it is undoubtedly derived from a maternal source.

B. x multiflora alba exhibits a breeding pattern that indicates that this plant is a homozygous structural hybrid. The *B. x multiflora* group backcrosses readily with *B. rosea* but intercrossing with *B. x parkeri* often results in irregular seed yields due to incompatibilities. Of all the hybrid types flowered the *B. x multiflora* crossed by *B. x parkeri* yielded the greatest diversity in the seedlings, particularly when 'Hathor' blood was present. From the seed patterns and from the seedlings flowered it is evident that the dominant features of *B. rosea* are sufficiently disrupted to exhibit numerous recessive *Eubrunsvigia* factors. Until more *Eubrunsvigia* type seedlings flower within the next year or two a final decision should be withheld, but it appears that *B. x parkeri* and *B. x multiflora* have different *Eubrunsvigia* parentages. This concurs with a view held by G. K. Cowlsham, who in the 1935 *Herbertia* suggested that *B. grandiflora* Lindl. was the missing parent.

MULTIPLE SCAPES ON HEMEROCALLIS

PHILIP G. CORLISS, M.D.,

S. W. Reg. Vice-Pres., Somerton, Arizona

Although double scapes (stems) on single crowns of daylilies are not uncommon, and triple scapes have been seen by many growers, I was unable to find any hemerocallarians at the 1954 meetings and garden tours who had seen a quadruple scape.

Because of this, I offer these two photographs which show such growth on a well-established clump of the evergreen (and nearly ever-blooming) variety 'Babette' (Hayward). Fig. 18.

There is nothing particularly attractive or desirable about the multiple scapes; they are ram-rod stiff, have too many crowded flowers followed by too many stumps and pods. The multiple stalks, like the flowers with extra segments, are often found on certain varieties which show this tendency. The factors disposing to the phenomena are: (1) variety known to show this characteristic; (2) well-established clump; (3) optimum water, plant food, and other growing conditions, such as temperature, drainage, etc.

The first photograph [Fig. 18] shows several scapes of 'Babette' with a triple scape at left and the quadruple scape to right of center. There are two double scapes and two single scapes between these two.

The second photograph [Fig. 18] is a closeup of the seed pods on the quadruple stalk. The pollen parent was 'Alnilam' (Saxton) an excellent bicolor of early and remontant bloom habit.

NARCISSUS BREEDING PROJECT, 1954

DR. J. S. COOLEY, *Maryland*

Again the narcissus group of plants have been a source of great pleasure and satisfaction. My seedling beds have continued to be interesting and beautiful. The planting of seedlings having a predominance of light colors was particularly pleasing. Many of the plants in this lot were outstanding in the blending of soft colors. They also showed a wide variety of form and growth habit. The possibilities are so great of getting interesting and beautiful flowers from a bed of seedling narcissus



Fig. 18. Multiple scapes (faciation) in *Hemerocallis* clone 'Babette'. Photo by Dr. Philip G. Corliss.

that it seems strange that more people do not choose as a hobby the breeding of this remarkable genus of plants.

The breeding of new varieties that are tolerant of one's local conditions of soil and climate is surely a worthwhile project. The outcome of such breeding work that is being carried out in many parts of this country as well as in other parts of the world in such a diversity of soil and climate will undoubtedly greatly promote and popularize this genus of plants.

It has been interesting to me to see how many of our visitors express a fondness for the jonquils and the jonquilla hybrids. Breeding work in this group is probably one of the avenues the breeder might follow with profit. There are many possibilities in this field that might well be promoted: quality of flower, color, time of blooming, and ability to persist.

One of the projects of the narcissus fancier is the quest for varieties that will thrive in his particular climatic and soil conditions. For some time I have been hunting for a long trumpet golden colored narcissus that will tolerate our conditions and be useful both for the home garden and also for supplying the florist trade. I have tried a considerable number of varieties, and, up to the present time, all things considered, 'Dawson City' has been by far the most satisfactory. Many of those I have tried are apparently good under some conditions, but for our conditions they have been very unsatisfactory. 'Golden Harvest' is an example of such a variety.

A group of plants that thrives in such a diversity of soil and climate as the narcissus surely should be used and enjoyed by more people. More and more people are becoming members of garden clubs and apparently more people are becoming flower conscious. These things will probably ultimately make for a greater appreciation and use of narcissus.

HYBRIDIZATION OF HYMENOCALLIS

LEN WOELFLE, *Chairman,*
Pancratieae Committee

For those who might care to turn their creative abilities to the improvement of this genus let it be understood at the outset that here lies a challenge to all the ingenuity you may be able to muster, but also be assured that almost any new cross will give something of merit. Hybrids with the Ismene group as seed parents are not easy to come by. There will be few seeds from many pollinations unless you can develop a technique so far undetermined. Many of the evergreen types set fertile seed and perhaps future development lies in that direction. The hardy species might also be brought to bear to give offspring which might be used as permanent garden plants, not requiring the fall digging and winter storage.

Yes, indeed, this is a fertile field for improvement. So far as I have been able to determine there are at present only five proven hybrids and one of doubtful parentage available in the trade.

Hymenocallis x 'Advance'—(*H. narcissiflora* x *H. x 'Festalis'*).

H. x 'Festalis'—(*H. narcissiflora* x *H. longipetala*).

H. x 'Olympia'—(supposedly *H. x 'Sulphur Queen'* x *H. narcissiflora*).

H. x 'Daphne'—(*H. narcissiflora* x *H. speciosa*).

H. x 'Sulphur Queen'—(*H. narcissiflora* x *H. amancaes*).

H. x macrostephana (supposedly *H. narcissiflora* x *H. speciosa*).

Although the genus as a whole, has many fertile species, and most will thrive with cultivation, many do not readily set seed. To date I have

enjoyed moderate success with hybridizing in the group. All seedlings are as yet unnamed and none are ready for distribution.

Seedlings of one species *H. harrisiana* often show hybrid characters when immature, but turn out to be parthenogenetic seedlings. Several of my later attempts hold promise of being true hybrids, but true proof is in the bloom character and these have not yet bloomed. To date the following attempts may be listed:

- #5001—*H. amancaes* (seed) x *H. longipetala* (pollen).
- #5002—*H. amancaes* (seed) x *H. narcissiflora* (pollen). (reciprocal to 'Sulphur Queen' cross).
- #5003—*H. narcissiflora* (seed) x *H. amancaes* (pollen). (duplicates the 'Sulphur Queen' cross).
- #5004—*H. harrisiana* x *H.* x 'Festalis'.
- #5008—*H. harrisiana* (seed) x *H.* unknown (pollen).
- #5101—*H. harrisiana* (seed) x *H. amancaes* (pollen).
- #5102—*H. harrisiana* (seed) x *H. narcissiflora* (pollen).
- #5103—*H. harrisiana* (seed) x *H. longipetala* (pollen).
- #5105-A—*H. narcissiflora* (seed) x *H. harrisiana* (pollen).
- #5105-B—*H. narcissiflora* (seed) x *H. harrisiana* (pollen).
- #5106—*H. narcissiflora* (seed) x *H. longipetala* (pollen). (duplicates the 'Festalis' cross).
- #5208—*H. narcissiflora* (seed) x *H. amancaes* (pollen).

Of the crosses mentioned above, numbers 5001, 5002, 5003 and 5106 have all bloomed and hybridity is proven. All others should bloom in 1955. The crosses #5105-A and #5105-B were two separate pollinations, and show enough variation between the seedlings to list separately.

Germination of *Hymenocallis* seed varies little from one species to another. The seeds are merely anchored (not covered), and kept moist and lightly shaded until germination is completed (evidenced by decay or shrinkage of the seed).

Seedlings of the *Ismene-Elisena* group, the deciduous species from Texas, *H. harrisiana* and possibly some of the other Mexican species must be dried off after the germination is completed and left to rest in this dry condition until spring when water may be given to produce foliage. They should be kept in active growth as long as possible the first year to produce the largest possible bulbs. If left in the pots over winter the young bulbs will get off to a much quicker start the following spring when they may be removed from the pots and plunged into the garden with the ball of soil intact. After a full summer's growth in the open soil of the garden, most should bloom the following spring.

Seedlings of the evergreen types may or may not require a rest period after germination. If foliage is produced after germination they should be kept in growth, but some are intermediate in their habits between the *Ismene* group and the evergreen group and might require the rest period before starting active growth in spring.

Obviously the seed of the hardy types should be handled so they may be disturbed as little as possible. They would probably require

moisture over winter, and the best way to handle these might be to plant and leave them right with the mother plant. If crossed with the tender or *Ismene-Elisena* group, some intermediate treatment would seem in order.

Flowers are The Maker's most beautiful gift to the world, and if we can leave just one good new plant creation to posterity, we shall not have lived in vain. If success in this pursuit is not meant to be, we shall be the better for having tried.

DAYLILY NOTES, 1954

W. D. BALLARD, *Maryland*

The 1954 season here for daylilies has been very dry and hot. Such conditions pose difficult problems for daylily breeders, especially in the evaluation of new seedlings. One has a feeling that they are not showing their true characteristics and one is afraid to discard as rigorously as should be done under more normal conditions. On the other hand there is some satisfaction in knowing that anything showing up well under unfavorable conditions is likely to be even better when conditions approach normal.

Nature, fortunately, has provided the daylily with unusual powers of survival under conditions of scant moisture—their fleshy storage roots act much like bulbs in this respect. With the return of moist conditions their ability to recuperate is quite remarkable. Generally the most satisfactory method of germinating daylily seed is to plant them out of doors in late fall or early winter. Usually they come up very well the following spring. Their growth from then on depends in a large measure on soil conditions and the presence of ample supplies of moisture. With dry summer conditions one is often disappointed at the lack of growth made. However, when such seedlings are dug up for transplanting, it becomes evident that the lack of vegetative growth has been to a large extent compensated for by the excellent development of storage roots.

Many daylilies set seed freely under natural conditions and unless seed pods are removed before the seeds shatter the volunteer seedlings soon become a pest. This is particularly true in nursery blocks where it is so essential to keep named varieties free from rogues.

On the other hand some daylilies do not set seed unless artificially pollinated and a few—such as 'Europa'—are notably sterile. 'Ruby Supreme' has often been pointed out as a variety which seldom sets seed. One would naturally expect some difficulty in crossing ordinary varieties with the new tetraploids. However, seedlings have been secured from crosses of two un-named sorts with 'Brilliant Glow'. Two tetraploids would probably cross more readily but so far few varieties of this type are available to the average grower. This new type should open up an interesting field for the hybridizer but it will take a few years to determine how much promise there is in this new direction.

It has always been difficult for the hybridizer to know what progress is being made by other workers in all sections of a country as large as this. Without this knowledge he may hesitate to put a new variety on the market. However, there is one side to the question which should not be overlooked. Because a variety is outstanding in one section, it does not necessarily follow that it will succeed equally well in all other areas. It is undoubtedly true that many varieties developed in regions of abundant moisture and moderate temperatures would not stand up in the hot sun and high temperatures of the mid-west and south. It might simplify matters for the hybridizer to forget about developing daylilies adapted to all sections of this big country and concentrate on producing suitable varieties for his own particular region. If his originations should then prove adaptable to some other sections, so much the better. His aim, however, could be narrowed down to the region with which he is most familiar.

[PLANT LIFE LIBRARY, continued from page 63.]

regulators, vitamins, micro-nutrients, enzymes, and soil-water-mineral-nutrition relationships. Chapters 1 to 9, are concerned with general considerations, morphology and physiology; Chapter 10 to genetics; Chapter 11 to evolution; Chapters 12 to 21 to taxonomy; and chapters 22 to 23, to ecology. This stimulating text is highly recommended.

THE MICROTOMIST'S FORMULARY AND GUIDE, by Peter Gray. Blakiston Co., 575 Madison Av., New York. 1954. pp. 794. Illus. \$10.50.

This detailed new book consists of two parts, (1) the first 16 chapters are a treatise on the art of making microscope slides from biological specimens, and (2) chapters 17 to 28 are devoted to a detailed classified list of the formulas and techniques used in this art. A list of abbreviations used, books and journals cited, and an index complete the book. This mine of information is indispensable to all who are concerned with the marking of microscope slides.

ECONOMIC GEOGRAPHY, by C. F. Jones and G. G. Darkenwald. Rev. ed. Macmillan Co., 60 5th Av., New York. 1954. pp. 612. Illus. \$6.75.

In revising the text, the authors "have taken into account the many effects of war and reconstruction, evolving political affairs, new discoveries, and technological advances." As in the first edition, the subject matter is organized "by types of activities or industries: hunting, fishing, gathering of forest products and lumbering, grazing, farming, mining, manufacturing, transportation and trade." This excellent, easily readable text is highly recommended.

MANUAL OF THE PLANTS OF COLORADO, by H. D. Harrington. Alan Swallow, 2679 So. York St., Denver, Colo. 1954. pp. 666. \$8.00.

This is the only complete flora of Colorado now available. It includes keys for the identification, and complete descriptions of, the 117 families, 693 genera, 2,794 species, 263 varieties and 88 subspecies recognized.

[PLANT LIFE LIBRARY, continued on page 112.]

4. AMARYLLID CULTURE

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

EXPERIENCES IN GROWING HYBRID AMARYLLIS

NICHOLAS T. URHAUSEN, *Illinois*

By way of introduction I must admit that I grow my Amaryllis simply as a hobby; I have been growing them for about thirteen years now, having started with the cheapest and I am now growing some of the finest from Holland. They are all grown in a greenhouse.

I'll begin with pollinating the flowers. I never use any brushes, but simply remove the stamen and anther and fertilize the pistil when it has opened.

About four weeks later the seed is ripe (in April and May), and I sow it immediately on one-inch squares in a mixture of two-thirds good garden soil and one-third granulated peat; then it is watered well. The temperature is kept between sixty-five and ninety degrees Fahrenheit—the temperature gets this high on sunny days. The flats are covered with a pane of glass and kept in the shade, and they require no more water until the seed is well germinated; then the glass is removed. About three weeks after sowing the roots emerge from the seed, and a week later the leaf sprouts can be seen.

I water them only when there is good air circulation, thus avoiding damping off. Since the original mixture was rich, and the peat helps to retain moisture well, the seedlings can remain in these flats till the following December. Then they will begin to grow rapidly with the coming longer days.

In December then they are transplanted into benches filled to six inches with a mixture of about three-fourths good garden soil (mixed with some superphosphate and bone meal) and one-fourth rotted manure and sphagnum moss. The moss keeps the soil loose and it seems the roots develop many side rootlets into it. With a temperature no lower than sixty and anywhere up to one hundred degrees Fahrenheit many should bloom in another year. During the growing period adequate moisture and heat are much more important than the type of fertilizer used; they love a humid, though not stagnant, atmosphere created by a wetting of the foliage on sunny days and *a shading on the glass during the hot summer.*

My discussion of the flowering bulbs will begin at the stage when they are through blooming. I cut off the scapes at the base of the bulb when no seed is desired, usually the leaves are already growing nicely.

The first flush of leaves comes before, with, or after the flower scape; I like to have mine bloom in late January to early February so that they have a long season ahead to grow. The first leaves come in February, from four to seven; in early June some send up more leaves; in mid August they all send up another flush of leaves. It is very important

to give sufficient water at these growing periods which last for about three weeks in February, and two weeks in June and August due to longer growing days. Long and strong healthy foliage is so important to the *Amaryllis* because it in turn rejuvenates the bulb. If I happen to break a leaf or damage one without completely severing it I simply leave it alone; usually it knits and keeps on being active. I never cut off any green leaves; when the bulb doesn't need them they turn yellow by themselves and can be removed.

So often people notice red dots, streaks and what have you on the upper or lower parts of the leaves; I have the strongest conviction that this comes from too much sun. In the greenhouse I have about fifty pots partially shaded, and there are red marks here and there on those most exposed to the sun; in another section I have thirty in complete shade until noon and partially thereafter; there is not a single red mark or scratch on any of the leaves of these thirty pots.

Towards fall I keep right on watering my *Amaryllis* as they use it; naturally it is less than the summer amounts, but they still are watered and kept moist until January when they begin sending up their new scapes; if their leaves are still green I leave them on, but they usually turn yellow as the new growth appears. During December I scratch some bone meal or superphosphate in the top of the soil so it will begin breaking down when the leaf growth begins in late January and February.

Often with a bulb growing the second year I wonder if I should repot the bulb. In late December I simply knock the bulb with the soil out of the pot, and, if I see a good network of roots all around the outside of the ball of soil, I return it to the pot for another year; if the bulb seems loose with no or few roots I repot it in new soil. I think a bulb should be able to grow in the same pot for at least two years, as long as the soil stays loose, of course often it becomes very hard as much of the humus has been used up. I do my repotting in December.

When new bulbs arrive I pot them up immediately, leaving whatever roots there are on the bulb. I like to keep them as warm as possible (fifty-five to seventy degrees Fahrenheit) to induce root growth; although they often seem to send up scapes in a warm temperature at the expense of the bulb, still it is much easier to induce root action, than leaving them in a cool temperature (forty to fifty degrees Fahrenheit) where no growth or root action takes place. Sometimes it seems bottom heat helps new roots to grow. Certainly bulbs will not rot as easily under warm conditions as they do in cool. Scapes have no bearing on roots starting, but leaves do, if the leaves begin growing actively you can be sure new roots are forming and growing. This leaf growth never hinders the flowering ability; I think it improves it.

In my potting mixture I add bone meal, superphosphate, rotted manure, sphagnum moss, and sand to keep the soil loose. Soils that pack hard cause many new bulbs to fail to grow, and to die. After the bulbs are through blooming, such a soil is packed so hard that the roots find it very difficult to penetrate the soil.

The pots I use are always seven- or eight-inch azalea pots; I would use even bigger ones but they get too heavy to handle; I see absolutely no advantage in using small pots. My best blooms come from bulbs growing in the open benches with their roots unrestricted. It does seem that the roots have a special affinity for wood, and I think rotted wood in the soil would suit them very well.

I never dry any of my bulbs, but naturally in their November and December resting period I apply very little water, just keeping them moist. Their rest is induced by the shorter darker days; dryness alone won't make them rest.

Whether to plunge the pot containing the bulb in Summer outside, or remove the bulb and soil and plant directly into the garden are difficult questions to answer. In a pot the plant dries out much quicker. If you remove the bulb from the pot you face the problem of taking the plant in, in the Fall, and the bulb is disturbed to the extent that the leaves all turn yellow a few days after the replanting. If kept in pots, they remain green well into the Winter.

REMINISCENCES OF A BULB GROWER

W. E. RICE, *California*

In the old days, that is some thirty or more years ago, I used to grow commercially, only for the big jobbers of the country, about sixty different kinds of bulbs, but as time went on it was deemed advisable to cut down especially during the depression, about 1930. Then when things began to get better, it was found we had a lot of new competition. It was found that we had to grow in larger quantities so as to ship in car load lots. We also found we had inquiries for Hybrid *Amaryllis* which we were not growing. We did have about six very choice bulbs in our own garden, so we started in with these six; saved the seeds and in doing so we found each individual flower gave us anywhere from 75 to 90 seeds.

By buying some outstanding varieties we soon had a pretty good planting, and the first thing we knew, we had better than 12 acres of them.

Of these we selected the very choicest stock to breed from. Soon we had so many of them, but we would not sell. One of our customers asked, "when are you going to let us have some of your pets." It's funny about *Amaryllis*—you grow them for a living but yet you hate to part with them. We however, divided them up; keeping of course the very best for ourselves.

After a while the business grew so we could ship them East by the car load. Then it was that we decided to have some named clones. We started to propagate by cutting, rather tedious work when you are used to only field work. When one has 47 acres of bulbs, one has little time to experiment. When we cut up around 500 bulbs, we just had to take the time to take care of them. We were fairly successful at this and managed to get commercial quantities of pure white, pure red—both light Red and dark Red. We got one so dark we named it 'Zulu' and it

went over big. Another, orange scarlet we named after the best half of our family 'Lady Helen'—of this one we never had enough. Another we called 'Java'; this one was purple or magenta with a pure white throat. Another we named 'W. N. Campbell', a large, very round bloom, white with bright scarlet blotches. We also had a few others, and found that to make any money in Amaryllis you must have named clones; then you never get into any trouble as the buyer gets exactly what he buys.

We also had a good lot of Nerines, one outstanding clone we named 'Pink Triumphant.' We still believe it is the most valuable Nerine yet produced. It can be brought into bloom about the 15th of December, and by the 15th of January they are through blooming. At this time flowers are not only scarce but in big demand. When we let loose of them, we sold the larger bulbs to Van Tubergen at Haarlem, and the rest we sold to Tom Craig here in California.

Well so much for bulbs. Los Angeles County grew so fast and we sold our acreage for subdivision and sold out all of our planting stock—

CONSIDER THE HYBRID AMARYLLIS

ROBERT G. THORNBURGH, *California*

This is a flower that will nearly always appeal to a man who ordinarily does not concern himself with flower gardens or flowers. One made the comment on seeing a full Amaryllis bloom,—“Ordinarily I care nothing for flowers or gardening and my wife takes care of all that sort of thing but this is a flower that I could really go for.” The women are attracted almost equally to them. Forced into bloom in a pot, however, they often present problems in home display without any leaves and an ugly pot to hide. There are many ways to get around this fault my own being to sink the pots in the planters that are around the house which ordinarily contain large philodendrons but still have enough space to accommodate the pots. Ordinary kitchen aluminum foil around the pot or other florist devices to dress up the pot can be used. The cut stems simplify this problem but make the problem of producing seeds more complicated. Cut stems, however, are readily brought to seed as described by Mr. E. Both in his excellent article on hybrid amaryllis appearing in the 1949 issue of *HERBERTIA*. Merely suspend the cut stem in a large necked bottle such as an ordinary milk bottle, and cover the space between stem and neck to retain the humidity within the bottle. An inch of water on the bottom is sufficient. Do not allow the stem to touch the water, otherwise the former will begin to rot. It, nevertheless, gets almost more than enough moisture to keep it going till seeds are mature. Often as not there is not even a “rust” formation on the stem unless it touches the water.

For one who is obtaining his first bulb of hybrid Amaryllis it is wise to obtain the largest possible size. These will as a rule bloom even if poorly handled. If potting is delayed and the bulb warmed a little it will begin to put out a stem even before it is potted. A small bulb may be a big disappointment in not blooming the first year. Here in

California it is possible to bring hybrid *Amaryllis* into bloom in 18 months from seed, and this is not difficult nor does it require skill. Such bulbs are usually quite small but will bloom by virtue of a well established root system. If the bulbs are transplanted some roots nearly always perish and the subsequent blooms may be set back a year or two. It is noteworthy that in growing hybrid *Amaryllis* from seed in sufficient quantity, it is possible to have blooms eleven months out of the year. The reason for this seems to be that seedlings do not feel obliged to bloom in the proper season the first time but they fall in line when older and bloom around Easter time as the older bulbs do. There is, of course, the exceptional older bulb that will get an atavistic urge and bloom in the middle of the coldest part of winter ignoring the dormancy of its companions. This will happen if you have enough of them around.

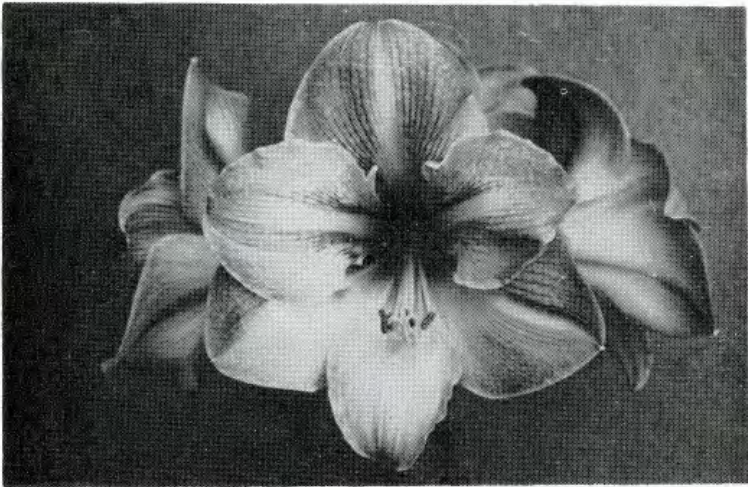


Fig. 19. Hybrid *Amaryllis* 'Apple Blossom'.

For several years I had accepted the dictum that Holland bulbs of the named varieties were suitable only for greenhouse culture, and that they were not hardy out of doors. This has not been my own experience. Here in California the Holland named varieties are hardy and their seedlings even more so. Experience with the Mead strain, which are so hardy in Florida, has shown that they are less hardy in California than the Holland strains. Howard & Smith's Nursery is an outstanding example of this since their extensive plantings are hardy in California extremes of heat, dryness and cold. Their strains are superior by virtue of the fact that they were crossed with the Holland varieties for many years, according to statements made by employees of that Nursery. It has always been a question in my own mind if the Dutch varieties might not even be as hardy in Florida in spite of previous reports to the contrary. It has come to me through a personal communication from an *Amaryllis* fan in Fernandina, Florida, that the Dutch named varieties are

quite hardy in his area. When one considers that a bulb received from Holland is, as a rule, quite large and can be forced the first season and not uncommonly for two seasons, it is hardly a fair conclusion to arrive at in saying that these bulbs are not hardy out of the greenhouse. If given a good root system after they have recovered from forcing and seed production, they do well in the ground.

It is well to remember when purchasing named varieties that are advertised as clones that it is possible for the blooms on the self same bulb to vary somewhat from year to year in color, shade of color and in markings—not to mention that a self colored bloom without the slightest bit of green on it does not guarantee that all future blooms will lack a little adulterant green. After several years of comparisons and observations it is my firm conviction that reliable Dutch bulb growers are yearly and regularly producing and exporting clones.

In making an attempt to pass on personal experiences as to likes and dislikes it is hoped that the reader will not gain the impression that there is anything scientific connected with grading the quality of bulbs or blooms in this instance. The following notations as to personal impressions of named varieties cannot be compared with Thomas Manley's evaluations carried out under fairly uniform greenhouse conditions. They represent results that the amateur may obtain under reasonably good culture.

Purchase the bulbs and arrive at your own opinions.

WHITE

Of those brought to bloom in the early part of 1954 'Ludwig's Dazzler,' 'White Giant' and 'Marie Goretti' of Ludwigs strain were superior and all were marked Grade AA. 'White Giant' lived up to its name this time. 'Ludwig's Dazzler' was the clearest of whites with no green whatsoever present either posteriorly or anteriorly. 'Marie Goretti' was most graceful. On Christmas day a van Meeuwen's 'Albino' bloomed. This was graded A plus. It was of very flat face and nicely shaped with evenly matched segments. The green that showed in this flower gave it a most cool and beautiful appearance. Now that extremely pure whites are available, I'm beginning to appreciate how beautiful the addition of green can be to a white flower.

BICOLORS

'Candy Cane' (Ludwig's) Grade A. This is one of the most outstanding novelties in a variegated hybrid amaryllis introduced in some time. A flat faced Leopoldii type with wide segments. The color design is quite symmetrical and tasteful. The color was Mandarin Red (17/1 Royal Hort. Soc. Colour Chart) which predominated. The outstanding thing was the one-fourth inch white border that outlined each segment completely. Along the center of each segment from the throat outwards about two-thirds of its length was a similar white stripe of the same width. The appearance was of a light salmon but in spite of this it was

bright. If placed by itself so as not to be outshown by a brilliant red, it was extremely outstanding and colorful.

Howard & Smith bicolor; temporarily dubbed 'Harvey' after the person it was obtained from whose father has a crinum that bears the name of 'Harvey.' This is almost precisely the same as Ludwig's 'Candy Cane' with the exception that the color is Currant Red (821/1) giving the appearance of an intensely dark maroon and as if laid on with a sticky oil paint that was still fresh. The segments on this one are so wide as to be almost circular individually giving the entire face of the flower same shape. Again the one-quarter inch white border; and a white stripe from throat to tip on the posterior segments only. On the anterior segments the same stripe of one-quarter inch white was broken before reaching either the tip or the throat. This was graded an AA since its color was better than 'Candy Cane' though the design on the



Fig. 20. Hybrid *Amaryllis* 'Fidelity'.

face was otherwise nearly identical. Once in a while as you approach a field of hybrid amaryllis in full bloom from a distance one of the blooms will stand out over all the rest. This clone was that way when first seen. and when one approached closely to examine it one was not disappointed. In fact, at close range it was even more striking. Many of the Howard & Smith hybrids have this color and I have not encountered its exact shade in any of the importations.

'King Of The Stripes' (Warmenhoven) Grade B. Between Shrimp Red 616 and 616/1 (RHS), white border and white center stripes on segments that run their full length. Very uniform. Remainder of segment surface had multiple shrimp red stripes so merging together as to give an impression of near solid color from a distance. Upper three segments more intensely colored than lower three. Minimal green in throat. Reminiscent of Mr. Wm. Rice's 'C. W. Cambell' though the

color was not as brilliant. Actually the color was a little dull and what Houdyshell terms "brick" color resembling in a good many ways the Mead strain.

Howard & Smith bicolor (Resembles Mr. Rice's 'Java') Grade A. A one-inch border of Turkey Red (721/1) with a white center. Stamens white. Apple green deep in the throat is clean against the white rather than streaky or "dirty" in appearance. Tubular flower with wide posterior segments and anterior ones less wide. The older salesmen at Howard & Smith's nursery have stated that Mr. Fred Howard strove for large posterior segments and small anterior ones in his crosses and propagation for better form. This has been noticed as a characteristic of many of the amaryllis from that nursery.

PINKS

'Apple Blossom', Grade AA. (See Fig. 19.) Porcelain Rose (620/2)



Fig. 21. Hybrid *Amaryllis* 'Doris Lillian'.

at the distal half of segments shaded most delicately to white at the mid point but blending to a faint, exquisite green deep in the throat. The base of each segment was astonishingly touched with a spot of bright red that made it look almost accidental or as if someone had purposely attempted to artificially add an improvement. Posterior portion of segments apt to be darker Porcelain Rose 620/1 to 620 (RHS). Very round, full faced and flat. The blooms all angle upward 20° to 45°. Because of this the six blooms were crowded indeed on a single scape. Perfectly named. Perhaps this should have been included under bicolor classification but it leaves one with the feeling that he has seen the most delicate of pink flowers.

'Rose' (John Hix). This is exactly like Warmenhoven's 'Sweet Seventeen' in every respect. Chinese Coral 614/1 (RHS) Grade B plus.

'Fidelity' (Ludwig), Grade AA. (See Fig. 20.) Porcelain Rose, 620/2 (RHS). Very wide segments. Medium sized bloom. Flat face. Center of throat has an apple green which gives much character to the color of this flower.

'Doris Lillian' (Ludwig), Grade A plus. (See Fig. 21.) On a good sized bulb two scapes of four blooms each with 7-inch face. Small bulbs had two blooms per scape. Cherry (722/3). Tends to the crimson or bluish side as it ages. The color is most intense and is always clear. The form is invariably good. Incidentally, it is most vigorous in the open ground, offsets generously and its seed is gratifyingly vigorous.

'Pink Perfection' (Ludwig). Carmine Rose (621). Grade AA. Seven-inch faces. This and 'Doris Lillian' have proved to be the best of the rose varieties for me. It is another good offsetter with vigorous seeds and is more hardy in the ground than some. Here in California it can be depended upon to be vigorous in the ground. The color is less brilliant than 'Doris Lillian' and it is more apt to show greenish posteriorly than the latter. It seems better than 'Pink Favorite' which shows more green but one might well suspect that all three of them along with Ludwig's 'Margaret Truman' are closely related if not of the same parentage.

SALMON

Howard & Smith salmon self. Grade B plus. Poppy Red (16/1). Very clear tubular shaped. Much veining. Again posterior segments are wider than anterior ones—a characteristic of Howard & Smith's strain previously referred to.

PICOTEE

Howard & Smith's. There were several of these. The picotees were not distinguished by being pure whites with picotee. The picotees for the most part were fine red margins on white blooms but the segments were blotched with red like the cheeks of the ladies of fashion of the 1920's. This was not unattractive though they were not purely picotee on white. For the most part they were of good form and were graded A minus. The only pure white, if the green in throat were ignored, with picotee were two bulbs of Herman Brown's. These were the most perfect picotees but lacked good form. At the present time I know of no source where a pure picotee might be obtained as such. van Tubergen withdrew their picotees from the market because they would not come true from seeds and were impractical from a commercial standpoint.

REDS

The reds are undoubtedly the eye catchers of them all. This year as last the two clones of van Meeuwen, 'Queen Superior' and 'Purple Queen' (also called 'Superba') were most outstanding both rating AA. 'American Express' of Ludwig was next but almost equally preferable though the form was quite different. In some ways the latter was more outstanding in that it presented a more flat and rounded face that from a distance caught the eye more readily.

'Queen Superiora' (van Meeuwen) Grade AA. The buds unopened were Currant Red 821 (RHS). Throat Blood Red from 820 deep in center to Scarlet 19 on remainder of segments distally. Actually the bloom has a darker appearance than the color chart can indicate with an over-all scarlet sheen reflected from light that gives one the impression that the color was artificial in its sparkling brilliance. It is a most capricious flower and does not always open as easily as some. When it does it is so spectacular that one has difficulty in believing one's eyes. It is possible that the crinkled and twisted petaloid "ears" in the throat may complicate the opening process. The blooms often angle upwards about 45 degrees. It is said that this makes the flower more desirable.

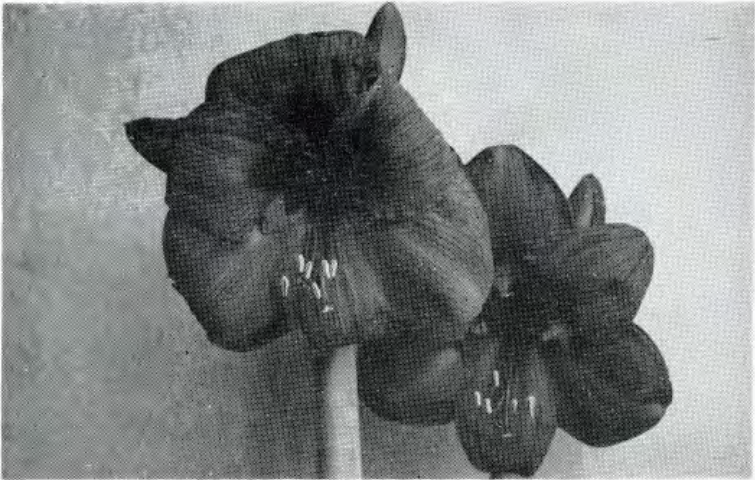


Fig. 22. Hybrid *Amaryllis* 'Ludwig's Scarlet'.

'Purple Queen' (van Meeuwen). Grade AA. This is the same as 'Queen Superiora' in all respects except that it is a deeper red. Though it has never shown "purple" for me it is almost a blackish-red and I'd rather have it this way than purple. This is the same as 'Superba'.

'Lady Helen' (W. E. RICE) Grade A. Segments wide at mid-portion and pointed at tips with trumpet form. Mandarin Red 17 (RHS).

'Ray Denslow' (Ludwig) Grade B plus. Dutch Vermillion 717/2. Full face, short tube. Scanty yellow streaks in throat. Startlingly brilliant in its ability to reflect light. Tends to become extremely large. The large round flat face so desired by most amaryllis fanciers is a common characteristic of the Ludwig varieties. This one is 8 to 9 inches across the face the measurements in each case taken with ruler laid on segments—no effort being made to stretch segments to increase the measurement size.

'Ludwig's Scarlet' (Ludwig) Grade A minus (See Fig. 22.) Dutch Vermillion 717/2 to 717 (RHS). Almost no tendency for yellow streaking in throat. Very bright.

'American Express' (Ludwig) Grade A plus. Again the 8 to 9 inch face. The form in this variety is the ultimate in flat rounded blossoms. Not only that but the texture is so sturdy that it will hold its shape without recurring backward. The color varies according to the circumstances of heat and light. There is usually a yellow streak 2 inches long at the base of each segment in the throat if in the very bright sun. This does not detract somehow from the quality of the bloom. It is most dependable to draw exclamations from onlookers. The fact that it has no "ears" in the throat portion of the segments gives an illusion that the face of the flower is much larger than it actually measures. Dutch Vermillion 717/1 (RHS).

'Bleeding Heart' (Ludwig). Signal Red 719/1. Large bloom, wide segments, ears in throat.

'Peacefulness' (Ludwig). Grade B plus. Vermilion 18 (RHS). Good clear color with few yellow lines in throat. Tubular bloom. Flower star-shaped. It has a gleaming scarlet glow that increases from the mid portion of segments to the tip not unlike a neon light when viewed in the direct sunlight. The throat is somewhat deeper in shade.

'Alcyone' (van Meeuwen) formerly called 'Bordeaux'. Blood red 820 in throat to 820/2 on face of segments. Very dark red and perfectly clear anteriorly with only a minimal tendency to green along the proximal half of keel posteriorly. Crenated wavy margins with the crinkled ears twisted together in the throat. Very graceful. Grade A plus. This one bloomed January 10, 1955. Small scratchy yellow lines in the throat ruled out Grade AA.

'Franklin D. Roosevelt' (Ludwig) Grade A. Orient Red 817 (RHS). Another deeply dark red. Appropriately named. Consistent bloomer year after year.

MORE EXPERIENCES WITH DUTCH HYBRID AMARYLLIS

JOHN T. WEISNER, *Florida*

In the 1954 edition of HERBERTIA the author told of some of his experience in the propagation of Dutch amaryllis, both from seed and by the cuttage method. Since writing that article approximately one year's time has elapsed. First of all, he reported that he had had exceptionally good growth on 'Doris Lillian'. In fact, some bulbs were growing as much as 3½" in little over a year's time. You can imagine his surprise last spring when this flower bloomed and he found it not to be 'Doris Lillian' but an ordinary Dutch self-colored red of approximately 7½" to 8" in diameter. In surveying the amount of growth that these seedlings and the bulbs from the cuttage method have made he has found that all of the reds misnamed 'Doris Lillian' have reached at least 3½" in diameter. Many of these are 4" or better in size even though they have only been planted 24 months. Five of these bulbs bloomed during the past blooming season. Practically all the 'Ludwig Dazzler' bulbs are

at least 3" in diameter. Many of these are growing up to 3½" in diameter with all the bulbs still putting up new leaves and growing vigorously. 'Red Master', although growing remarkably well, has not equaled the growth of the 'Ludwig's Dazzler' or those misnamed 'Doris Lillian'. This statement can also be made of 'Albino' and is especially true of 'Red Sparkle' which has grown only fairly well. 'Margaret Truman' grows almost as well as 'Ludwig's Dazzler'. The pink seedling that was labeled No. 10 (as mentioned in the 1954 article) looks vigorous but no bulbs exceed 3½" in diameter.

'Bordeaux' grown in prepared beds as mentioned in the article of last year grew almost as well as the bulb misnamed 'Doris Lillian'. 'Violetta' bulbs of the same age growing between 'Bordeaux' and the misnamed 'Doris Lillian' have not made the same growth as the others. In fact, they will run approximately 1" smaller than 'Bordeaux' or the self-red.

Seedlings growing outside in the ground under partial shade have shown variable characteristics. Seedlings of 'Red Master' (selfed) have all made splendid top growth even though most of these bulbs run 2¼ to 3" in diameter. Seedlings of 'Albino' (selfed) made growth from 2¼" to 3½" in diameter. Seedlings of 'Fidelity' are running approximately 2½" in diameter. One of these bulbs only 2" in diameter bloomed during the month of May.

Many of the seedlings grown from the Dutch seed planted in September of 1951 bloomed during the past spring. Several of these were very good flowers. Many were average and only a few of these were what the writer considers a poor flower. One remarkable feature was that all of the whites (approximately 15) that bloomed were self-white. That is, no red or streaks. All of the reds (approximately 20) bloomed self-red with the exception of about three. Approximately five salmons bloomed, none of which were outstanding amaryllis flowers. That is, they did not have too good a shape or were rather small in size. There were two rose-colored seedlings, one of 8" in diameter and the other approximately 9" in diameter that were exceptionally good if one will be willing to concede that he may have some green in the throat of a rose or pink flower. Both of these have now been cut for propagating purposes.

The writer's observations are as follows: Seedlings of 'Red Master' are rather vigorous growers although they do not make too large a bulb. Seedlings of 'Moreno' are good growers, making large bulbs and having a great deal of vigor. It might be mentioned that the author transplanted 80 small seedlings of 'Moreno' from flats in the spring of 1953. All of these bulbs are living, some of which are now running up to 3½" in diameter even though they were planted outside in the ground. Seedlings of 'Queen of the Whites' are not vigorous at all. In fact, after blooming 'Queen of the Whites' for four years, the author feels that he cannot expect too much from the seedling of this flower both as to vigor or quality of the flowers. Seedlings of 'Margaret Truman' and 'Pink Perfection' and 'American Fashion' are rather vigorous and should easily make blooming size bulbs in three years.

It is rather odd that the seedlings of some bulbs seemingly have the ability to resist most the pitfalls of a growing bulb while others do not. The author has in mind a rose-colored seedling that he purchased. The seedling from this bulb when crossed with other flowers always gave good strong growing stock. Another oddity that he has noticed is that 'White Giant' does not set seed although pollen from 'White Giant' on other whites make seed. The author is also wondering about the seed from 'Ludwig's Dazzler'. He planted approximately 200 seed of a cross between 'White Giant' and 'Ludwig's Dazzler', and a white seedling using 'Ludwig's Dazzler' as the mother plant. The seeds formed and were normal in all outwardly appearances. However, none of these seed germinated although pollen from the same flowers of 'White Giant' when crossed with 'Albino' made seedlings that germinated almost 100 per cent. The same observations have been observed in propagating seedling from other amaryllis, especially some unnamed seedlings that have not been placed on the market.

The propagation of bulbs by the cuttage method has shown varying characteristics in various bulbs as to the ability to reproduce bulblets. For instance, the writer had a beautiful self-white seedling that was cut for propagation purposes. Only six small bulbs were produced. One can see that this bulb will never reach the commercial field, even though the flower is outstanding.

After the blooming season of 1955 the author feels he will have fairly definite information on what types of bloom one may expect from the seedlings of the following Dutch Amaryllis:

- 'Red Master'—Selfed
- 'Queen of the Whites'—Selfed
- 'Mt. Tocoma' x 'Queen of the Whites'
- 'Margaret Truman'—Selfed
- 'Red Sparkle'—Selfed
- 'Red Master' x 'Moreno'
- 'Moreno'—Selfed
- 'Violetta'—Selfed

also several unnamed seedlings.

27 YEARS WITH AMARYLLIS IN NORTHERN ILLINOIS

MRS. FRED TEBBAN, *Illinois*

I first became interested in amaryllis in the spring of 1926 in Florida where my husband and I lived at that time. A friend had a long row of these orange-red flowers that bloomed along her fence line in early spring. They were very attractive and I admired them very much. We returned to Illinois in 1927 and purchased a home thirty-seven miles north of Chicago. Shortly thereafter a neighbor gave me a small bulb which she said produced pretty lilies and made a nice houseplant. It

seemed to have the same type of leaf that I had noted on the Florida amaryllis so I asked if it was an amaryllis bulb. The neighbor said she had never heard it called anything but a lily, so I grew the bulb and watched and waited for a bloom. In a year or two it not only produced a bloom but several new little bulblets. I found the flower to be much like the Florida blooms, but paler in color and a bit different shape. Later I learned to call it "Equestre", and now know that it was the little *Amaryllis striata* var. *crocata*, the old fashioned household favorite. For many years this was my only amaryllis, but it multiplied so rapidly and was such a pleasing pot plant that soon all my relatives and friends had pots of amaryllis too. However, I longed for a red similar to those grown by my Florida friends, and noted in a flower catalog a listing of *Amaryllis* x *johnsonii*, a hybrid. I quickly ordered one and it too grew year after year producing two spikes of bloom of a lovely red shade with a white central stripe and a soft sweet fragrance.

Perhaps ten years after acquiring my first bulb I noted that amaryllis bulbs were appearing in the dime stores so I purchased two to add to my collection. One proved to be a very pretty light red (almost pink), the other a white with red stripes. These were really very nice in both form and color and grew and bloomed very well. This was my first introduction to the Mead strain.

In the meantime I had joined a garden club and had subscribed for a good garden magazine where I found Mr. Houdyshel's advertisements. In 1942 I ordered from him a pink bulb which has really ever since been my best and most satisfactory amaryllis bulb. It generally produces two scapes of flowers each year of a lovely shade of rose pink and is most dependable, blooming at the same time each winter. The form of the bloom too is excellent, and is probably the result of some of his own crosses with perhaps some of the Dutch strain in its parentage.

Then, in 1943 in this flower magazine I read of the amaryllis round robins being formed and hastened to become a member. We soon began exchanging bulbs and seeds, thus all enlarging their amaryllis collections. Through these round robins I became acquainted with Edith Strout, and to her I owe much of my knowledge of amaryllis culture and many of my fine amaryllis seedlings. I have directed two of these amaryllis robins for ten years or more and through them I have met many other fine folks whose hobby is also amaryllis.

In 1943 Mrs. Strout sent me a few seeds of amaryllis crosses that were given to her by Mr. L. S. Hannibal. Only four of these seeds germinated but these four all produced good bulbs. Three bloomed with very brilliant and beautiful flowers, but to this day, eleven years after, the fourth bulb has never bloomed. Why, I do not know, for each year it produces fine leaves and grows well, though never increasing greatly in bulb size. I also have a seedling of the McCulloch Hybrid Strain of which Edith Strout wrote in the 1954 HERBERTIA. It, too, has never bloomed. So I keep watching these two and trying to improve their growing conditions to get bloom from them.

In those early days we talked much of a "red rust" disease that troubled our amaryllis, and because of it many bulbs were discarded.

However, on a visit to Florida in 1949, I called on Mr. Wyndham Hayward, and inquired about this disease while discussing amaryllis culture. Mr. Hayward assured me there was no such disease and that red rust appearing on the leaves was only an indication that some condition under which the bulb was growing, was not to its liking. Too acid soil, too cool temperatures, poor drainage etc. might cause this red rust to appear.

As the wonderful Dutch hybrids appeared I have added one or two to my collection each year and have been moderately successful in their culture, though I continually strive for better success and to learn more of their needs and wants.

After joining the round robins and learning more about cultural methods, I began getting away from year round pot culture and began to plant the bulbs in summer in a protected spot in my flower border after all danger of frost was past. This has benefited many greatly, but entirely ruined others for I have lost all of my original *Amaryllis striata* var. *crocata* bulbs, and also var. *fulgida*, and *Amaryllis* x *johnsonii* has not bloomed for many years, but the good Mead bulbs I have and the Dutch hybrids seem to benefit by this method of growth. I lighten the soil in this amaryllis bed with sand and humus and shreaded fertilizer. Last summer I read every article I could find on foliar feeding and from June till mid-August I gave a weekly foliar feeding using chemical fertilizers containing the elements most needed for good bulb growth. I applied this feeding early in the day, about nine a. m., on hot days when the breathing stomata of the leaves would be open to absorb it. This is a heavier feeding schedule than is recommended but since our growing season for amaryllis is so short here, I wanted to make the most of it. When dug, I found all the bulbs had increased greatly in size so I am sure they have benefited from it.

One of my greatest difficulties has been to keep the many potted bulbs growing well after leaf growth starts in the spring. Due to our extremely late spring I cannot place the amaryllis outside until about Decoration Day, and without a greenhouse it is nearly impossible to give them sufficient sunshine to keep leaves from growing tall and spindly and lopping over. This year I am going to try fluorescent lighting in my basement and will give the plants about six hours of light each day after growth starts. I must also be prepared to return them to the basement soon after Sept. 15th because of the danger of early frosts or very cold nights, so I may use the fluorescent lights again at that season if they do not go dormant at once. The only pests that I have had to contend with here are thrip that eat the leaves, spoil the flowers and get beneath the bulb scales. However, with DDT these are now quite easy to control.

Over the years I have had only moderate successes and many failures. For instance; I soon learned that my friends' Florida amaryllis were not *Amaryllis* x *johnsonii*, but were the old Florida *Amaryllis belladonna* var. *major* (mis-named *equestris*). After three unsuccessful attempts I have given up trying these as pot plants or in my summer amaryllis bed for our growing conditions are just not right for them.

My aim has been to make a good collection of colors and shades of color, and not of species and varieties. Since 1943 I have kept a consistent record of bloom each winter, and in looking back over these records I find how many I have given away or discarded that I now wish I had kept, for I believe that every amaryllis that gives a pleasing bloom is worth saving even though it may fall short of some standards. I like very much the flat faces and the rounded petals of the lovely Dutch hybrids, but I also like *Amaryllis striata* (*rutila*), the good Meads and *Amaryllis* x *johnsonii* of the earlier years. In short, I LIKE AMARYLLIS.

AMARYLLIS GROWING IN DOWNEY, CALIFORNIA

J. F. STEWART, *California*

In my younger days my gardening activities were confined to doing my share of the spade and hoe work for my mother, an enthusiastic nature and flower lover who always had an extensive garden, and gardening was at that time uninteresting to me. Later—much later—after growing some things of my own in my own garden, the fever grew on me and has been constantly increasing. I went through what is no doubt the usual course of growing almost every flower for which seeds were obtainable, including the more common annuals, perennials and bulbs that will grow in this part of the country. I still can't resist growing some of the favorites, but am concentrating on hybrid Amaryllis. Concentrating during evenings and week-ends, that is, since the week-days are spent (or should it be "wasted"?) earning a livelihood.

I started growing Amaryllis in 1943, after having seen some of Mr. W. E. Rice's bulbs in bloom. The first seeds were purchased from Rex Pearce, but none sprouted. Mr. Rice gave me some seed from his field-grown stock, a number of which bloomed and were, of course, beautiful, but were not too satisfactory for breeding stock. Those next acquired were some Howard and Smith bulbs which were quite satisfactory, and some imported Dutch bulbs from a local dealer, which were not. These Dutch bulbs were a complete failure, since, though two of them lived long enough for the flowers to open, the bulbs all rotted.

In three or four more years the stock of bulbs had increased enormously, but it was becoming apparent that the material was not as good as it should be for satisfactory breeding and that something should be done to correct the situation.

By this time, the Amaryllis-growing hobby had taken over.

A small glasshouse was purchased, proved to be entirely too small, but served its immediate purpose. I still have it and use it, but have purchased a larger one, about nineteen feet by twenty-four feet. I contacted the American headquarters of the Dutch bulb growers association, whose advertisement I had seen, for the name of someone from whom I might obtain some Dutch bulbs. Among the names they gave me was that of Mr. Wyndham Hayward, of Winter Park, Florida; a name which I now know is familiar to all AMERICAN AMARYLLIS SOCIETY members.

This was most fortunate for me. Through him I immediately obtained some Ludwig seed and some Dutch bulbs, and have had much more material from him since, both Ludwig and Warmenhoven, all of which has been completely satisfactory. He has helped me with advice and I have enjoyed a not profuse but very pleasant correspondence with him.

The acquisition of these bulbs, and the seeds which are now blooming size bulbs, opened the second phase of my enjoyment of, and experience with, *Amaryllis*. I now had stock to be proud of and which gave me good breeding material. Unfortunately, when I was in school, botany was for girls. Zoology was O. K. for boys, but not botany. I now very much regret my ignorance of so many things I should know, but am doing what I can about it and will gradually acquire some of the necessary knowledge.

The Ludwig seed which I have had has given good results, although I have been able to get only about 75% germination. Those that have bloomed to date have come almost entirely true to color and there has been a high percentage of first grade blooms. In one crop of pink and salmon seeds about 25% bloomed as two-year-olds, and these were inter-pollinated, producing a few thousand seedlings which are being kept isolated in the faint hope that some of the early-blooming trait will be inherited. These seedlings will be grown outdoors, whereas the parents were grown in the glasshouse in gallon cans, which may have accelerated their development. The last crop of bulbs from imported seeds will bloom this year. From now on all new seedlings will be from my own crosses. In addition to the above-noted seedlings from two-year-old parents I have three groups of crosses which are being grown separately: Dutch pollen on my American bulbs, my pollen on Dutch bulbs, and Dutch on Dutch. These are all being grown outdoors and there are about six or seven thousand bulbs of all ages in the ground. A few of these are due to bloom this year, more next, and many thousand in 1956—I hope.

In addition to these I have one more crop of my own American seedlings, without Dutch parentage, which will bloom and be heavily culled out this year. My own blooming size bulbs have been culled to the point that they are all of known characteristics and are planted in rows of separate colors. The flowers are all of good color, of reasonably good form, and over six inches in diameter. So far, reds and stripes predominate, with fewer salmon and pink. There are no pure whites in this stock.

Outdoor growing seems to be quite successful here, in a light sandy loam which is very pleasant to work and drains well. The beds have been well fertilized with chicken and cow manure and 5-10-10 commercial, and occasionally some liquid ammonia which is available to me. Grows good weeds, too. We usually have enough frost to kill the leaves and force the bulbs into dormancy, but not enough to harm the bulbs. This year the frost has been light and to date, February 1, most of the bulbs are still growing.

I have been doing quite a bit of vegetative propagating for three years and it is a most fascinating procedure. There are two hot-beds now, about five feet by seven feet each, and the wiring has just been

finished so that two more may be activated. They are heated by thermostatically controlled soil-heating cables and are not too expensive to operate, but it was difficult to find the equipment, part of which was assembled to order. The coil is laid on the bottom of the bed, with the cables spaced at about four inches on centers. Across these are laid one-quarter inch by two inch redwood slats at about eight or nine inch centers, to protect the lead-covered heating cables from damage. The spaces up to the top of the slats are filled with sand, and the propagating flats set at this level. The spaces up to the top of the flats are also filled with sand, making the bed about five inches deep. Common building sand, with the fine gravel sifted out on an eight-mesh screen, is used as a propagating medium in the flats.

When the propagating program was started, a lower temperature was used, and it has gradually been increased to the present 68° to 82° spread. This seems to be the best temperature for my conditions, but when the new beds are ready I expect to try still higher temperatures on a few expendable bulbs, in an attempt to establish a maximum.

Both the Luyten and Traub methods as described in the 1935 Amaryllis Society Year Book have been given thorough trials, with the Traub method giving much better results. The over-all average now is about forty to fifty bulblets potted up from each bulb propagated. From one light pink only four have been potted up, with a possibility of one or two more yet to develop; and, from one beautiful large white propagated last summer, sixty-one are potted off and growing, with several more possibles still in the flat. From one large salmon there were eighty-three bulbets, but not all of these will mature. Satisfactory results have been obtained from all colors of the Dutch stock. Cuttings have been made during all months except April and May, and results seem to show that July, August and September cuttings do best; but those made during October, November and December also do well. From now on an effort will be made to get all cuttings into the beds during the summer and early fall, so the process will be far enough along to allow the beds to be cleaned up for the next year and part of the space to be used for forcing blooms, if desired, in the spring. Our spring, by the way, begins in January.

About the only major difficulty encountered has been a bad siege of leaf scorch (*Stagnospora*) on the bulbs in the glass-house. It is bad right now, but may be somewhat arrested, although it is difficult to be sure. A friend, Mr. R. D. Durbin, in the University of California at Los Angeles plant pathology department, has advised dipping in either formalin or mercuric chloride and has recommended a specific program for me, to be followed by spraying with bordeaux or copper-lime dust. This program has not yet been tried to a sufficient extent to provide any conclusive results, but a greater effort will be made later on and perhaps there will then be something of value to report.

Quite a large number of buds are now showing in the glass-house and it won't be long until blooming season. First the blooms there, in March, April and May, and then those outdoors from June until the first frost in the fall. There is no telling what the new crop will produce—

maybe some wonder bulbs. As Jimmy Durante says, "I love that kind of carrying on!"

THE FASCINATING HAEMANTHUS

ARMYN SPIES, *Illinois*

Haemanthus are African bulbous plants, of which the greater part come from the Cape region. The flowers are very showy in some species and often numerous. Like most of the Cape bulbs, they usually are summer and autumn flowering, the flowers usually preceding the leaves. The foliage is large and luxuriant and often the scape is spotted and colored. In some species the leaves and stems are also spotted, usually with a brownish color. Some of the individual flowers are as much as two inches across and the whole ball of bloom ranges upward to nine or ten inches in diameter. This is my favorite plant of the *Amaryllidaceae* next to the amaryllis itself, but they are not generally known and are considered as curiosities in this country. Their season of growth is usually from six to eight months for some and others remain evergreen for the year round.

Their culture is very simple. A soil mixture of equal parts of loam and peat, with a little sand added, suits them. The bulbs should be planted with the top half protruding from the soil. Several may be planted in a large pot, or they may be planted singly. Water sparingly until the roots are formed and growth starts.

While blooming, they should be put in a cooler situation to keep the flowers longer. When the leaves begin to grow, the pot can be put in a window that is partly shaded, for these are partial shade plants. The temperature should be around 55 degrees at night and around 70 during the day. The plants should be watered when dry and fed with a complete fertilizer once a week while in active growth. A complete water soluble type will suffice.

When the plants have completed their growth period and they show signs of resting, such as the leaves turning yellow and drying, they should be dried off and put in a dry, warm situation until they show signs of flowering and wanting to grow again. It is not necessary to repot the plant each year, the bulb can be kept in the same pot and fertilizer applied as needed. They resent repotting and also should be in a small pot so they become rootbound. Most of them will do well in a 5-inch pot, with the exception of *H. Katherinae*, which when older takes a 10-inch pot. There are no serious pests for these plants so they are relatively pest-free.

Descriptions of the most popular haemanthus follow:

H. albiflos, type variety, is probably the best known of the *Haemanthus* group. It has two to four leaves about 4 inches across and sometimes a foot long or longer with good culture. The flowers are white, and the umbel will carry 100 or more flowers. The plant is evergreen, blooming in the fall, but with pot culture, it has been known to flower at any time.

H. carneus is a small species that is a winter grower. It has two

small, prostrate, almost round leaves. The umbel of flesh pink flowers comes in July or August. Growth starts after flowering and goes dormant in the late spring.

H. coccineus is the true BLOOD LILY. This is my favorite. The umbel of scarlet or blood-red flowers comes in August after a three months dormancy. The scape is an orangish color and brightly colored with red blotches. The spathe is a bright shiny orange color and flairs somewhat while blooming, making this bloom most attractive. Two long, almost pendulous green leaves follow the flower. The underside of the leaves are blotched a brownish color. This would be a suitable plant to hang in the partially shaded window.

H. Katherinae has been called the most beautiful of flowering bulbs both in flower and foliage. The umbel is usually 10 inches in diameter and the huge red flowers usually number upwards to 125 or more. About 5 broad leaves spread from the top of a 10-inch stem. It flowers usually in June, but sometimes comes as late as September. Usually around the first of the year, the neck splits and new growth emerges, making this an evergreen plant. Sometimes the neck does not split, and when this happens, the neck is cut from the base of the stem upward and the growth pried outward to relieve the pressure. The old growth can be cut off about 4 inches above the break or cut.

H. multiflorus resembles *H. Katherinae* in appearance. The umbel is somewhat smaller usually 6 inches and the flowers are red. The stem supporting the leaves is spotted brown. It has about the same growth cycle of *H. coccineus*.

There are other species, but they are not in the trade and a few may be found in private collections.

There are several hybrids of the *Haemanthus* and probably among the best is *H. x Andromeda* which is a *H. Katherinae* x *H. magnificus* cross. This is described as being the largest flowered and most vigorous of all. The gigantic spherical head of salmon crimson-red comes in June.

'King Albert' is a *H. Katherinae* x *H. puniceus* cross. The flowers of this are red and the umbel is on a short stem.

For the beginner I would recommend that at least the *H. albiflos* be grown, for it is the easiest grown of the species. *H. coccineus* most probably would be as easy to grow but one must recognize the growth cycle and adhere to it in order to have flowers. It is very well worth while for the gorgeous bloom.

Haemanthus should be ordered early in the year and they will be sent at the proper planting time, thus making it possible to see the flowers the first season.

Haemanthus produce red fruits containing seeds. The flowers are hand pollinated by rubbing the palm of the hand over the flower umbel, when open, every few days as all of the flowers do not open at the same time. This spreads the pollen to the pistils. Wait until the fruits are quite red before taking from the plant. The outer pulp should be removed and the seed planted by pressing down slightly into the soil but not covering. Quite a number may be planted in a large bulb pan. The soil should be rather loose as growth begins with the emergence of a

radicle from the seed. If the soil isn't loose it may have to be broken to allow the radicle to penetrate. This radicle penetrates the soil and forms a bulb from which leaves soon emerge.

THE INCOMPARABLE *LYCORIS AUREA*

SAM W. SAYLER, *Florida*

It is difficult to understand why this incomparably lovely plant is not grown in every garden in the Southeastern United States, and also in Texas, and California. On the east Florida coast it grows and blooms to perfection as shown by my own experiences.

During the past several years I have grown *Lycoris aurea* obtained from gardens in St. Augustine. About three years ago, *Lycoris aurea* became available by importation from Japan. The price was reasonable and I ordered 100 bulbs from Japan. During the first year, the imported bulbs bloomed about two weeks earlier than the local form. I thought at first that this difference was due to transplanting, but during the second, and also the present year (1954), the earlier flowering trait was again noted. The bulb-necks of the St. Augustine form appear about $\frac{1}{2}$ inch above the ground a few days earlier than those of the Japan-imported form, and the latter produce offsets more abundantly.

The tepalsegs of the St. Augustine form are slightly different from those of the Japan-imported form and are not quite as ruffled. The greatest difference is however in the foliage which is very dark green and glossy in the Japan-imported form, and much lighter green and not glossy in the St. Augustine form.

Both forms set seeds freely to self-pollination *here* although others, in various locations and under pot culture, report that the St. Augustine form is mostly self-sterile. Last year I had seedlings about three inches high in several pots, but unfortunately they were lost during the dormant stage. I intend to self-pollinate and also make crosses with other species next year, and will report on these experiments later.

Both forms of *Lycoris aurea* multiply freely here in Fernandina Beach, and bloom regularly each year. One bulb of the St. Augustine form planted about 5 years ago now (Sept. 1954) has about 18 or 20 bulb-necks above the ground. They will probably all bloom at the same time within the next three weeks.

The soil in our garden is common to this locality, and no fertilizer has been used in growing *Lycoris*. They probably would respond with a still lovelier floral show if a little mineral fertilizer were applied.

NERINE BOWDENII AND OTHER NERINES; NEGLECTED BEAUTIES

WYNDHAM HAYWARD, *Florida*

One group of the Amaryllids is conservatively described as surpassing all other fall-blooming bulbs in sheer, fragile beauty and delicate loveliness, and that distinction belongs to the Nerines. In them there is brilliance of color, sparkling overlays of gold dust, the rich, silky sheens of scarlet, pink and crimson shades, and all the grace and charm that the flowery kingdom can provide.

Nerines, it might be said, are a luxury of the bulb world, something refined beyond the common ken of ordinary beautiful plants, feminine in their gentleness as growing things, and yet with a certain firmness and strength of character under good conditions of culture which compel admiration beyond the due of their ornamental qualities alone.

And it is this inherent strength in the flowers which makes them so desirable. There is nothing fleeting and wispy about the Nerines in flower. The stems are wiry and strong, if slender, and the umbels last in good condition for weeks, when grown in a cool, ventilated atmosphere.

Nerines are popular in greenhouse collections in England, and there have been a few notable collections in America, among them that of the Thomas Roland firm at Nahant, Mass., and there are classes for these fall-blooming beauties in the fall Chrysanthemum show of the Horticultural Society of New York. They are features of the London Royal Horticultural Shows in Fall.

Perhaps in line with their feminine nature, the Nerines are temperamental creatures. They require that little touch of extra care which makes them a success. Actually they are easier than orchids and begonias and many other pot plants, but they have their little idiosyncracies which must be respected.

Nerine bulbs can be purchased from a California dealer. In Florida they grow best outside under oak trees, in pots of sandy leaf-mold loam, enriched with a little well-rotted cow manure and neutralized by the addition of a small quantity of finely ground oyster shell. This seems to suit the bulbs in Florida where the soil is naturally well on the acid side in most locations. In California the Nerines are more at home, and a number of species and hybrids are offered by the dealers.

The reader should consult previous volumes of *HERBERTIA* for other illustrations of various nerines.

The best modern account of Nerines is in Col. C. H. Grey's "Hardy Bulbs," Vol. II, London, 1938, pages 83-93 where the British author discusses most of the species which are to be encountered in the trade at this time.

The species which is the subject of this article [Fig. 23] is *Nerine bowdenii*, W. Watson. It is related to the old *N. flexuosa*, and is a fairly modern addition to the group, having been found in east Cape Province, South Africa, in 1903. It has proved one of the most amenable to garden and pot cultivation. The bulbs are usually 1½ to 2 inches in diameter,

shaped like an Italian wine bottle, and remain in flower for a period of several weeks in the fall. The individual flowers open gradually, and the umbel stays in good condition with several flowers open many days at a time, if grown cool.

Col. Grey states that this species is hardy in the South of England



Fig. 23. *Nerine bowdenii*; a luscious pink in color. Photo, Wyndham Hayward.

if planted in a sheltered position with proper soil. All *Nerines* seem to require rather a fertile, but sandy, well-drained type of soil, yet must not lack in moisture during their growing season. However, the curse of all *Nerines* is over-watering, especially with poor drainage conditions. This has cost the writer many good *Nerine* bulbs in the past in his Florida experimenting, and the same problems must be met in the greenhouse.

Nerine bowdenii has more the evergreen habit than most other Nerines, although a few others as the dainty *N. filifolia* are nearly evergreen. The best known species of Nerines are *N. curvifolia*, *N. filifolia*, *N. Bowdenii*, *N. pudica*, *N. flexuosa*, and *N. sarniensis*. Because of the readiness with which the Nerines seed, they have been hybridized frequently and a long list of the hybrid named varieties is mentioned in the English literature on the subject.

The Nerines, like various other interesting Amaryllids, are all members of the South African flora. They are generally grown in pots, but in Southern California, especially around Santa Barbara, it is said, succeed in the proper location in outdoor plantings. They want good, sandy loam, and small-sized pots with extra good drainage. Excessive heat in summer with moisture present will usually result in rotting of the bulbs. For this reason they are not adapted to ordinary outdoor culture in Florida and similar sub-tropical climates where there is a heavy summer rainy season. There the *Lycoris* are more at home. However, in Florida and similar climates the bulbs may be dried off in shaded greenhouses in summer.

They seem to flower better in the small sized pots. Fives or fours are all right for largest bulbs. They make their main leaf growth during the winter months like *Lycoris*, but do not like wet summers as the *Lycoris* seem to do in Florida and the Southeast generally.

In winter when growing, the plants should be given all the light possible. A cool temperature not below 45 or 50 degrees F. is satisfactory. When the leaves wither and die off in late spring the bulbs should be rested. During the summer, little or no water should be given, unless to prevent actual withering of the bulb roots. The bloom spikes will appear in the fall.

The constitution of the *Nerine* is such, however, that it resents moving. It will do better two or three years in the same pot and the more root-bound the better. *Nerine bowdenii* has succeeded with the writer in the open in Florida, the pots being grown under the partial shade of oak trees. The rains are well dispersed by such foliage and possibly in this way the pots were spared a sloshing and drenching which they would have received in the open in Florida otherwise during the rainy season of summer.

Nerine bowdenii is a lustrous, luminous pink, "good enough to eat" as they say, and a despair to the artist who would seek to capture the exact shade in his oils. The scape is about 14 inches long and the umbel may have eight to ten or more delicate, crisped flowers, the petals having a deeper colored stripe down the middle.

The Nerines have an interesting place in botanical history. One species, *N. sarniensis* (the specific name means "of Guernsey") is so called because it was first observed by botanists growing in the sands of that Channel Island southeast of England where it had been washed ashore from the shipwreck of a vessel which was bringing the bulbs from South Africa. This is a beautiful thing but little known in America. It has been cultivated in the Channel Islands for 200 years, according to the European writers.

The December, 1949 number of the English magazine, "Gardening Illustrated," carried on page 283 an excellent illustration of the Nerine Hybrid "Hera", as shown at the Royal Horticultural Show in London Oct. 4-5, where it was exhibited by Clarence Elliot, who showed "a number of vases of a beautiful hardy Nerine, ('Hera') with glistening rose-pink flowers and deeper shadings." The flowers were carried on 2-foot stems, and the plant had already received a First Class Certificate in 1920 so could get no higher award. The article says the plant "has since (1920) grown outdoors in a Gloucestershire garden with complete success."

However, those English gardens are deceptive in their hardiness and one should be careful about planting any *Nerine* bulbs outside in United States gardens without abundant precautions for full protection against freezing weather.

In the Southern states, *Lycoris radiata* was known for years as *Nerine Sarniensis*, and "The Guernsey Lily" and so described and listed in leading Southern gardening texts of the time. The masquerade was solved through the efforts of members of the AMERICAN AMARYLLIS SOCIETY in 1935-36. So far as known, no bulbs of the true *N. sarniensis* exist in the Southern states.

ENDURING DAYLILIES

J. B. S. NORTON, *Maryland*

Any large mass of data collected finds other uses than that for which it was formed. The annual "Popularity Poll" of the Hemerocallis Society gives the 100 names receiving the most votes of a large number of gardeners, and is mostly of use to growers in selecting daylilies for their gardens.

After adding their dates of publication as given in "Descriptive Catalogue of Hemerocallis Clones" (1949) I am using them to indicate those that have remained in gardens longest, knowing that most of the older ones have been discarded.

The oldest in this 1954 poll is 'Mikado'; this and four others all originated by Dr. Stout, 'Taruga', 'Dauntless', 'Patricia', and 'Linda', are the only ones included from 1929 to 1936. The next oldest is 'Hesperus' (Sass), 1937. Three go back to 1938, 'Duchess of Windsor' (Traub), 'Chloe' (Nesmith), 'Persian Princess' (Nesmith). Mrs. Nesmith's 'Bold Courtier', 1939, and her 'Pink Charm' and 'Glowing Gold', 1940 are still in the elite list.

The number still strong in gardens increases slowly in 1941: 'Caballero' (Stout), 'Revolute' (Sass), 'Ruby Supreme' (Wheeler), 'SuLin' (Nesmith), and 'Gay Troubadour' (Nesmith); but 10 published in 1942 are still counted worthy: 'Athlone', 'Painted Lady', 'Purple Waters', 'Mrs. Hugh Johnson', 'Queen of Gonzales', 'Mrs. B. F. Bonner', 'Black Prince', and 'Purple Sage', all from Russell's garden; also Watkins' 'Swan', and Nesmith's 'Royal Ruby'.

In the years 1943 to 1946 only 12 remain: 'Potentate', 'Jean', 'Easter Morn', 'Orange Beauty', 'Amherst', 'Babette', 'Mamie Lake', 'Gold Cargo', 'Mission Bells', 'Prima Donna', 'Georgia', 'Midwest Majesty'.

The flood of 55 more in 1947 to 1951 are too close to now to evaluate for enduring quality.

CRINUMS IN SOUTH TEXAS YARDS

LLENORE FRELS, *Texas*

Today (October 23) I visited at a home here in Mathis that has a foundation planting of *Crinum augustum*—a tall stately variety that holds its foliage up.

Now you may be wondering why I am writing about crinums. Well, as a matter of fact, I have seen a lot of crinums in my lifetime, as everyone who has lived in South Texas has. You can't escape them. They are in almost all the old yards and in some of the new. Six times this summer I have seen crinums blooming in vacant lots where probably a house once stood.

I got into this crinum writing because I sent the editor a post card asking why he didn't get out a crinum edition and he sent a postcard right back asking why I didn't write an article on crinums. You could have knocked me over with one tepalseg of *Crinum moorei minor*.

I have a bulb of *C. moorei*, a dainty little thing that I am tempted to try for a while in a pot. It goes dormant in the late summer or early fall; grows along slowly through the winter and spring; and just sits still when the weather gets hot. This is its third fall in my yard and it hasn't bloomed yet. But surely it will bloom. If it doesn't it will be the first crinum that refused to bloom in South Texas. I really think if the rabbits would leave it alone it would get up enough energy to produce flowers. Every time it grows a nice set of foliage a rabbit comes up out of the guajilla brush and eats the leaves off.

It was the rabbit that decided be to do this piece for the editor. At least I know what varieties the rabbits like. During the summer I bought a new variety (new to me) called *C. ornatum* with pretty crinkly foliage that matches the name. It hasn't bloomed either, but as soon as it sent out leaves the rabbits had a feast. A little piece of poultry netting rolled into a tube fixed it up until it gets big enough to fend for itself and at the rate it's growing that won't be long. Next, *C. scabrum* (also a new bulb) looked as if it had had a bite taken out of its new foliage so it got a little wire fence. But most Crinums don't appeal to rabbits. I've had a white EASTER-LILY-LIKE *Crinum* and a MILK AND WINE LILY ever since I've had a garden and no rabbit ever took a second look at them.

Last spring in late March I cut up a small bulb of a kind called shell pink, just to see if Crinums can be propagated by cuttage, set them in a pot of compost, and buried the pot under a banana. The cuttings soon sent up leaves (but not as quickly as some Amaryllis cuttings made the

same day) and the rabbit took a bite of the new leaves, taking the cutting out of the very loose compost and spit it out and left it alone.

The white Easter-Lily-like *Crinum* goes by a number of names here. Some call it RAIN LILY because it blooms after summer rains. Some call it AUGUST LILY because it blooms usually in August, but that is because it usually rains here in August. Some call it ANGEL LILY, but I have never known anyone who spoke of it as a *Crinum*. There are undoubtedly thousands of them in our little town and countryside, and it is a slow multiplier. I dug mine last summer for the first time and there were 11 bulbs in a clump where I had originally planted one white AUGUST LILY and one MILK AND WINE LILY so close together that they formed one clump. They had been there 20 years or longer. I had tried once before to separate them but gave it up as an impossible feat for the bulbs had reached far down into the earth. But we have recently moved and I wanted them in my new garden. It took me and one other person about two hours to dig them out without breaking too much of the roots.

It gives a *Crinum* a decided setback to cut off all roots when digging. But if they can be moved without breaking the main roots they seem to grow right along, not even wilting the foliage in midsummer if plenty of moisture is supplied before and after moving. A shipment of *Crinums* that came recently from California had some with a good amount of roots and some with almost none. Those with roots had five full leaves each ten days after planting. Those without roots I hope will start making foliage before a freeze (if we have a freeze. Some years we don't, although usually we have several days and nights of temperatures below 30, not often below 24).

But back to the AUGUST LILY (not *C. augustum*). It had long drooping foliage and very many flowers open at one time, so that the spike almost always falls over to the ground. The tepalsegs are recurved on the tips giving the flower a frilly appearance and sometimes, but not always, there is a very faint bit of pink showing down the center of each tepalseg. Probably the pink shows up in cool cloudy weather, but fades out in hot sunshine. I have noticed that *Crinums* 'Louis Bosanquet' and 'Cecil Houdyshel' bloom a much paler shade of pink in summer than in spring.

Crinum augustum has a tree like shape and holds its leaves erect. If I were in the florist business I think I would try some of them in tubs or big pots for church decoration at weddings. I have never had one but I have noted that they are usually not crowded in clumps and the offsets are sometimes dug out without disturbing the main bulb, so it is likely that these bulbs do not grow naturally very deeply in the earth. It is a profuse bloomer and also blooms after rains. The bloom spike and the unopened buds are a most delicious shade of rose red but the fully opened flower is a disappointment. The buds are five to seven inches long and the tepalsegs are five to eight inches long and about $\frac{3}{4}$ inch wide, not by actual measuring but by approximations.

The tepalsegs are just simply too long for their width. The color is fine, a lavender pink striped affair, but the tepalsegs get entangled when the wind blows and the flowers are similar to a granddaddy long

legs in general build, hence one of the popular names is PINK SPIDER LILY. However the lovely color of the buds and the tropical appearance of the plant make up for the flower. And it has a very nice fragrance.

Recently when I was going about my part time job of being a country correspondent for our neighboring city newspaper, The Corpus Christi Caller-Times, said job being mostly writing accounts of weddings, teas, garden club meetings, and women's doings for the Women's News section, I stopped to admire an unusual arrangement of sanseveria and *Crinum augustum*, the unopened rose red buds and green mottled sanseveria rising from a low bowl, the long segmented flowers placed at the base where they could fall gracefully. It was quite unusual. A garden club member with me said mournfully, "And just to think, when we bought our house there was a whole row of those lilies growing in the yard and I couldn't rest until I got them dug up and sent off in the garbage. Now I'd love to have them."

TWO MILK AND WINE LILY varieties are plentiful here. One has a lily-shaped bloom with rose stripes, about 12 blooms to a spike, maybe three open at a time, the kind I have—slow multiplier. Two bulbs of this are blooming now.

The date has moved along since I started writing this. It is now November 10. We have had three frosty mornings in a row, but the MILK AND WINE LILY blooms were not touched. However I noted that the newer leaves of *C. scabrum* were burned by the frost so I am guessing it will be tender to cold.

Last week I visited two old homes with crinum plantings. Historical Round Lake at San Patricio, seat of an early Irish settlement, has about a thousand feet of crinum borders along walks, all one variety, a MILK AND WINE LILY with wide open recurved blossoms. I was told that the crinums were obtained from a convent at San Patricio about 1876, the sisters having brought them there. Other homes in that vicinity have quantities of the plant so I assume it must be a quick multiplier. The clumps in the borders at Round Lake had an average of five or six bulbs each. Some were in bloom but their main blooming season is in the summer.

At the other home, in Alice, I was told that the white AUGUST LILY variety had been brought from England when the family came to Texas in the 1850's. They were growing luxuriantly beside a pool. I can't remember ever having seen crinums used as a poolside planting before; but probably that's because this part of Texas doesn't have many pools.

My first interest in crinums came in 1950, when, country corresponding as usual, I walked into the basement of a local church and saw before me a magnificent bouquet of bright pink flowers.

"What are the flowers?" I asked.

"Oh those are Gwendolyn's pink lilies. You don't mean you've never seen them before. She brings them to church every year about this time."

After that I heard "Gwen's pink lilies" discussed at the garden club. No one knew what they were. Everybody wanted some. I decided to find out. I thought they were crinums.

Gwen said she didn't know what they were. Just pink lilies. Her mother had got a pink lily bulb 25 years before in New Orleans. The florist in her home town had brought in a number of the pink lily bulbs and planted them for the flower trade. When the townspeople began asking what they were the florist said she didn't know—just pink lilies.

When they asked to buy a bulb she refused to sell one at any price. Gwen's mother, a flower lover, thought the bulb she found in New Orleans might be the same. She didn't learn its name. It started blooming after a few years and was very pretty, but only bloomed once a year, while the florist's pink lilies behaved like rain lilies and bloomed after every summer rain.

I pushed my inquiries further and found others who knew of the fabulous "pink lilies." I was told that the bulbs in the florist's yard formed big clumps and she had them dug from time to time and reset. Among the tales was that the man who did the digging put one bulb in his pocket and planted it at his home. When it bloomed the florist saw it and made him bring it back.

While I was in pursuit of the lily's name I started buying crinums. A friend, who saw my *Crinum* 'Cecil Houdyshel' in bloom, hunted the florist's yard up while on a trip that weekend. The pink lilies were in bloom. She reported rows upon rows of clumps of them and thought they were the same as mine. She learned that the business had been sold and the new florist was selling bulbs, but to get one you must have your name put on a waiting list and when you did get one it would cost \$12.50.

An inquiry to Mr. Houdyshel brought the information that the bulb was not likely *Crinum* 'Cecil Houdyshel', because, although it first flowered in 1916 not many bulbs were sold until the late '20's.

I dismissed the subject from my mind but went ahead hunting pink crinums because by this time I was deeply interested—no, that is putting it too mildly. Completely fascinated is more accurate.

Some small bulbs given me by Gwen bloomed this summer and appear to be the same as one I bought under the name "Shell Pink".

Lately, I was told that the florist business had been sold again and the place was taken for a business site. A bulldozer had been sent in and it bulldozed the pink lilies down. Maybe I should write "finis" now. But somehow I can't quite see all those neighbor women sitting in their porches and watching that bulldozer destroy all of those bulbs. Surely somebody rescued a few.

Crinums that I have acquired are 'Ellen Bosanquet', 'Louis Bosanquet', 'Cecil Houdyshel', 'E. J. Elwes', 'Peachblow', 'Sovereign', 'Burgundii', *C. ornatum*, 'Ivory Princess', *C. scabrum*, *C. podophyllum*, 'Virginia Lee', 'Gordon Wayne', *C. moeri*, *C. bulbispermum*, *C. x Powellii alba*, and one described as "beautiful pink with deeper pink stripes". I am a sucker for a line like that. I bought three.

Then I have *Crinodouna x howardii* and 'Lon Delkin'. The latter hasn't yet bloomed for me but *howardii* was the finest flower that ever bloomed in my yard. It opened on July 4, with two or three blooms open each day. On July 12 the temperature went to 106 in the shade,

although it was a little cooler at our place which is out of town—just 102 on the back porch. *C. x howardii* could have been cut with three flowers wide open at 6 p. m. on July 23.

Only one crinum has ever set seed for me—‘Louis Bosanquet’, one lone seed, which I grew into one wee bulb. There is a crinum in local yards which looks like *C. bulbispermum* and seeds freely, but my *bulbispermum* has failed to set seed.

‘Louis Bosanquet’ bulb was a disappointment. I didn’t think it particularly pretty, but it did bloom once in February and it multiplies at a medium pace, a worthy trait in crinums.

I have observed that a bulb that produces very many offsets will not be too free with flowers. The shell pink bulbs which I suspect may be ‘J. C. Harvey’ (I have never seen this clone to know it) make a furious amount of offsets. Two that are growing side by side were reset last year. From one I removed the offsets to give friends and it produced three spikes of bloom and nine offsets this summer. The other had the offsets left on and it is now a clump of 17 bulbs, one large, three or four medium and the rest small. It produced two spikes of bloom, rather weak spikes.

The bulb called ‘Sovereign’ hybrid has foliage and offsets exactly like the shell pink but hasn’t bloomed for me yet. In fact most of them haven’t bloomed in my garden up to the present. They were either small bulbs when I got them or the roots had been cut off and consequently I did not get bloom the first year.

‘Ellen Bosanquet’, a big bulb, sent up three spikes of bloom. A young bulb of the same, which reached blooming size late in the summer, bloomed six weeks after the normal season for that variety. So it seems that careful attention to setting out young bulbs and caring for them might be rewarding with out-of-season blooms.

I have two large bulbs and two medium bulbs of *Crinum* ‘Cecil Houdyshel’. One large bulb made eight spikes of bloom during the summer. The other, which has an offset, made five. The spikes come out one after another around the neck of the bulb, each new spike being adjacent to the last. The one with eight spikes had completed the circle around the neck of the bulb when the eighth spike came out. I am hoping that the bulb will have grown enough by the coming summer to make room for ten spikes. The bulb that made five spikes is larger but the space where the offset was growing was skipped when the flower spikes came out.

The date is now November 23. I have been out to look at that *C. moorei minor*. No sign of a leaf and no sign of a bloom spike yet. I’m going to give it until Christmas day to bloom and if it hasn’t bloomed by then I’ll move it back to a full sun location, where it made nicer foliage than it has in a shady spot. [Editor’s note.—*Crinum moorei* requires partial shade and will not thrive in full sunlight.]

EDITOR'S MAIL BAG

The Henry Hybrid *Cyrtanthus* are the most satisfactory subjects in my garden in spite of the fact that we had to move in the fall of 1954. They were taken up in November in Arcadia and replanted in my garden at La Jolla in early December. The flower scapes had elongated several inches when they were replanted, but in spite of this the flowers developed normally. *Cyrtanthus* are long-lasting but in this cool winter climate near the Pacific Ocean, the flowers are still in good condition after more than six weeks (January 28) when this was written. Recently Mr. Hottes, the eminent horticulturist, who is a neighbor, accepted some blooms to be used for making a painting. These valuable Henry Hybrid *Cyrtanthus* will soon be offered by Giridlian, Box 444, Arcadia, Calif.

It is with the deepest regret that we hear that Prof. W. R. Ballard, of Hyattsville, Maryland, a faithful contributor to *Herbertia* for many years, has suffered a stroke in December 1954. We hope that he will soon fully recover. Prof. Ballard is carrying on most interesting breeding projects including among others the hybridization of daylilies, iris, roses, narcissus, magnolias, grapes, etc.

Dr. Thornburgh and family have recently moved into their new home in Palos Verdes Estates, Calif.

Dr. J. S. B. Norton, the venerable plant enthusiast, of Hyattsville, Maryland, writes (January 22) that they have had no real winter as yet—the lowest being 20° F. so far. He has taken Jasmine cuttings indoor for flowering, and has had fine flowers on his *Tulbaghia fragrans*. Mrs. Morton is having the best success to date with her African Violets.

Mr. John F. Cooke, Jr., Garden Dept., Cleveland Public Schools, is in charge of a fine educational program which should do much toward acquainting the younger generation with growing things early in life so that they may either take up such work as a profession, or be able to appreciate garden activities later in life as a satisfying avocation. Mr. Cooke is chairman of the new School Gardens Committee, and he will be pleased to exchange information with others similarly engaged. His fine article appears in this issue of *Herbertia*.

It is with deepest regret that we record the death of Mr. Pierre D. du Pont, a Herbert Medalist, in 1954. Mr. du Pont was a great *Amaryllis* enthusiast, and maintained one of the best collections of *Amaryllis* hybrids at Longwood Gardens (950-acre estate) near Kennett Square, Penna., which he acquired in 1906. Mr. du Pont left \$60 million to maintain Longwood Gardens which have been open to the public since 1921.

The Herbert Medalist for 1954, Mr. Thomas R. Manley writes, under date of February 26, 1955, that he is going into business for himself at Rt. 1, Lenerpool, Penna., beginning March 15, 1955. He will be growing gladiolus (20 acres), rotation crops and of course he will continue his work with the evaluation of hybrid *Amaryllis* clones. He is testing Ludwig and Warmenhoven *Amaryllis* clones and will report on these in *Herbertia*, grouping these under *Reginae* and *Leopoldii* divi-

sions. The editor is certain that he expresses the consensus of the members in wishing Mr. Manley all success in his new business.

Mrs. A. Primo, 707 Ruth St., Mobile, Ala., has recently undertaken a radio program—"Garden Clinic." During 1954, she received the "Caldwell Life Membership Award" given for outstanding horticultural achievement by the Alabama State Council of Garden Clubs.

The members are requested to send in interesting news items for the Editor's Mail Bag.

[PLANT LIFE LIBRARY, continued from page 80.]

There is a section on Vegetation Zones in Colorado, by David F. Costello; a glossary of terms; and an index of plants. This book is indispensable to all who are interested in the flora of Western United States. Dr. Harrington is to be congratulated on a monumental task well done.

IRRIGATED SOILS, Their Fertility and Management, by D. W. Thorne and H. B. Peterson. 2nd ed. Blakiston Co., 575 Madison Av., New York. 1954. pp. 392. Illus.

The expansion of research showing that "maximum yields from irrigation are dependent on the proper balance of such factors as fertility, plant population, plant characteristics, crop rotation, soil physical properties, and soil moisture," a premise on which the first edition was based, has justified the appearance of this second edition. Emphasis has been placed on basic principles rather than on field practices. The subject matter treated includes problems of irrigated regions; soil as a medium for plant growth; soil, water and plant relations; the salt problem; evaluating land for irrigation, source and quality of irrigation waters; measuring irrigation water; planning a farm for irrigation; irrigation practice; drainage; reclamation and management of saline and alkali soils; control of physical, and biological properties of soil; maintaining organic matter in soil; minerals and plant growth; fertilizer elements and materials; using fertilizers; soil management for field, fruit, vegetable and specialty crops; and farm planning. This outstanding book is highly recommended.

MODERN GARDENS, by Peter Shephard. Frederick A. Praeger, 105 W. 40th St., New York. 1954. pp. 144. Illus. \$9.50.

This attractive book deals "specifically with the planning, design and planting of the modern garden . . . to satisfy the practical and aesthetic needs of the present generation." Examples have been selected from the work of leading landscape and garden designers now working in many countries of the Western world. The 291 black and white illustrations are truly outstanding. This excellent book is very highly recommended.

THE MAJOR FEATURES OF EVOLUTION, by G. G. Simpson. Columbia University Press, 2960 Broadway, New York. 1953. pp. 434. Illus. \$7.50.

This concise, easily readable book "presents a general review of the history of life as seen in the fossil record and interprets the evolution of

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GENERAL EDITION

EDITED BY

HAMILTON P. TRAUB

HAROLD N. MOLDENKE

THE AMERICAN PLANT LIFE SOCIETY

Box 150, La Jolla, California

PREFACE

Mr. W. M. James contributes two interesting articles to this general edition of *PLANT LIFE*—California vacation trips and *Abies venusta*; and the Saratoga Horticultural Foundation with which he is associated. There is a brief review of Brook's new method for dwarfing and early-bearing in fruit trees. Dr. Corliss reports on a rack for exhibiting flowers. This should be of special interest to those who are charged with the staging of flower shows. There are also articles on rose breeding, dwarf thyme as a ground cover, and the genus *Ipheion*. Mr. Paul R. Young contributes an outline for the Gardening Program in the Cleveland Public Schools. Brief book reviews under "Plant Life Library" complete the issue.

March 30, 1955

*Hamilton P. Traub
Harold N. Moldenke*

[*PLANT LIFE LIBRARY*, continued from page 112.]

life in the light of the most recent data from paleontology, genetics, systematics and related sciences." The topics considered include rates of evolution; variation; mutation; population and selection; adaptation; evolution and adaptation; trends and orientation; extinction; relicts and irreversibility; horotely, bradytely and tachytely; higher categories; and patterns or modes of evolution. This stimulating book is indispensable to all who are interested in biology.

THE MIND AND THE EYE, by Agnes Arber. Cambridge Univ. Press, American Branch, 32 E. 57th St., New York. 1954. pp. 146. \$3.00.

This little book offers a "generalized analysis of the biologist's approach to his own subject and to philosophy." In the first part the topics considered are—the biologist and his problem; the mode of discoveries in biology; the logical background of the biologist's problem; the biologist's use of analogy; and the biologist and the written word. In the second part the chapter headings are—biology and truth; the basic assumptions of biology; biological antitheses; antitheses and dialectic; and the mind and the eye. All of us who have followed the thought provoking work of Agnes Arber through the years will welcome this recent stimulating contribution.

FUNDAMENTALS OF ECOLOGY, by Eugene P. Odum. W. B. Saunders Co., Philadelphia. 1953. pp. 384. Illus.

This book was written by an eminent authority "to serve as a textbook in a college course, and also as a reference for the naturalist and for interested workers in related fields, including the great and growing army of conservation workers, sanitary engineers, and other applied ecologists who need to be familiar with background work and theories in ecology." The book is organized in three parts: (1) basic ecological principles and concepts, (2) the habitat approach, and (3) applied ecology. This concise, easily readable text is highly recommended.

[*PLANT LIFE LIBRARY*, continued on page 146.]

CALIFORNIA VACATION TRIPS AND **ABIES VENUSTA**

W. M. JAMES

For several years the work that I was doing allowed only a short vacation which had to be taken with almost no advance notice, and there was little opportunity for time for short trips in between. As a consequence visits with old friends were few and far between.

On August 1, 1953 I was appointed as Horticulturist at the SARATOGA HORTICULTURAL FOUNDATION. This work is not nearly as confining as that done the past few years and this summer an ample vacation could be planned in advance.

Soon after Dr. Traub moved to California, I had an opportunity to visit him for a short time and was fortunate enough to see the green *Amaryllis viridorchida* in bloom. This flower must be seen to be appreciated. This summer I spent an evening with him and consider it a real treat to be able to sit and talk and see what he is doing in his laboratory.

Dr. Coit of Vista is probably not known to many of the readers of PLANT LIFE. He has been working with *Ceratonia siliqua*, commonly known as CAROB, for many years. He is spending two months in the Mediterranean region this fall studying this plant where it has been important for centuries. It was very interesting to be shown his work and listen to him give information that had been obtained by years of work and study. I saw an experimental planting of carobs which were in fine condition. Budded seedlings four and five years old which were bearing. These trees had never had a drop of water except the natural rainfall which is only ten to twelve inches annually in that region. They were growing near Vista, in the southern part of California about ten miles from the ocean.

Occasionally I have an opportunity to visit Mr. and Mrs. Orpet in Santa Barbara. He is well and active and still as interested in plants as he ever was. A visit there is always interesting.

Mr. Herman Brown has retired from his prune orchard near Gilroy and is living in Palo Alto. He has a greenhouse and a small piece of ground where he is growing his choicest *Amaryllis* bulbs. Time visiting with him is well spent.

Probably the highlight of the summer was a visit to a stand of *Abies venusta*. We left Morro Bay and followed State Highway #1 to San Antonio Road near the San Louis Obispo and Monterey County line. This road follows an old Indian trail across the coastal ridge of the SANTA LUCIA MOUNTAINS near Twin Peaks (4700 ft.) and Cone Peak (5000 ft.) to MISSION SAN ANTONIO DE PALA. The mission is on the old SPANISH TRAIL between Monterey and Los Angeles. It is a well graded narrow dirt road steep enough to require low or second gear most of the time, and with many sharp turns.

The SANTA LUCIA FIR (*Abies venusta* Koch; Plate 8) (see The Silva of California by W. L. Jepson) has a more restricted habitat than any other fir in the world. Its total range in the SANTA LUCIA MOUNTAINS



Abies venusta Koch, the Santa Lucia Fir, in its native habitat in Santa Lucia Mountains of California. Photo by W. M. James.
Plate 8

in Monterey County is about forty five miles from north to south covering a strip one mile or less in width. These mountains are extremely broken with very precipitous slopes and dense chaparral areas. It inhabits slopes from the moist canyon bottoms to dry rocky summits on the eastern and western sides of the coastal ridge. It is also well isolated geographically. No other species of the genus is known within two hundred and twenty five miles to the north, one hundred forty miles to the east and one hundred twenty miles southeasterly.

This fir was first discovered scientifically in 1831 by Thomas Coulter, a botanical explorer, who in 1832 made the overland journey from Monterey through the South Coast Ranges to SAN ANTONIO DE PALA MISSION and thence across the Colorado Desert to the mouth of the Gila River.

Following Coulter, many of the early botanists visited this area to see these unusual trees and obtain seed for use in Europe. However, the Franciscan Fathers at MISSION SAN ANTONIO knew of these trees long before the coming of these botanists. They were called "Incensio" by the Padres because from the cones resin was obtained for incense to be used in Chapel religious ceremonies.

Abies venusta is a slender tree from thirty to one hundred feet tall. The cones are borne on the younger branches on the top of the tree, are heavily covered with resin and their weight bends the branches down very close to the main trunk. The older branches remain and assume a horizontal position on the lower part of the trunk. At a little distance the tree resembles a slender church steeple with a very narrow pencil-like top. [see Plate 8.] This form is so characteristic that it furnishes a means of identification about as far as the trees can be seen. Seeing these trees in their native habitat is just about as impressive as the first visit to a natural grove of *Sequoia gigantea*. They are off the beaten track, but not too difficult to reach in a car with good brakes and a driver with steady nerves.

Just a word about my name in closing. "W. M." stands for "Wilfred McDonald." For some reason that I never learned I was always called "Donald" as a boy and my friends still use that part of my name.

PLANT NOTES

HAMILTON P. TRAUB, *California*

HESPERALOE SP. CLINT #514. Collected by Mr. & Mrs. Morris Clint in the Lower Rio Grande Valley, near Rosita, Starr County, Texas. The flowers are bright rose, without any creamy-white in the throat. Mrs. Clint has pointed out that this species appears distinct from *H. parviflora* var. *englemannii* on the basis of several plant characters and it may be *Hesperaloe funifera*. Mrs. Clint will report later more in detail on these plant characters. In the present note the dried capsule and seeds are briefly described.

Capsule globose, trilobed with a pointed apex; 19 mm. long, 8 mm. wide, slightly larger before drying. Seeds black, usually 7 to 15 seeds per locule, rarely as low as 4; usually 7 mm. long (varying from 6.5 to 8 mm.); usually 5 mm. wide (varying from 4 to 6 mm.); seeds typically D-shaped, flattish by pressure but somewhat thickened toward the rounded edge. When seed number per capsule is only a few, the seeds are much thickened toward the rounded edge, and appear like miniature quarters of an apple.

SARATOGA HORTICULTURAL FOUNDATION

W. M. JAMES

On January 1, 1951 a horticultural experiment station under the name of SARATOGA EXPERIMENTAL GARDENS was established near the town of Saratoga, California by Mr. and Mrs. Raymond D. Hartman, with Mr. Maunsel Van Rensselaer as Director. For many years Mr. Hartman has been a leading horticulturist on the Pacific Coast, and owner of the Leonard Coates Nurseries Inc., with headquarters in San Jose, Calif. Mr. Van Rensselaer is well known for his work in developing and directing the SANTA BARBARA BOTANIC GARDENS.

In May 1952 the Experimental Gardens were reorganized as a private, non-profit corporation under the name of SARATOGA HORTICULTURAL FOUNDATION INC. It is managed by a self-perpetuating Board of Trustees, and a Director who is responsible for the technical administration. Professional guidance is given by a Board of Counselors consisting of individuals prominently identified with western horticulture, arboriculture, botany and landscape design. The land, buildings, equipment, and plant stock on hand at this time were presented to the Foundation by Mr. and Mrs. Hartman.

The Experimental Gardens and the succeeding Horticultural foundation were organized primarily for the introduction, selection, and improvement of shade trees and native California plants suitable for garden use. This will include study of scientific laboratory findings related to propagation and plant growth for the purpose of improving nursery techniques and reducing costs. All work is done on a commercial scale and information obtained will be made available to nurserymen as progress warrants it. Plants grown are sold to nurserymen on a non-profit basis.

The sale of plants on the wholesale market will make the Foundation partially self-supporting. However, the extent and quality of experimentation and investigation will be dependent on supplemental income derived from public support. The commissioner of Internal Revenue has granted tax exemptions. Contribution of funds to the Foundation are allowable deductions in computing income tax and are exempt from gift tax. Bequests are exempt from estate and inheritance taxes.

Propagating material and plants of several improved forms of shade trees and native plants have been received through the generous cooperation of nurserymen, arborists and horticultural institutions through-

out the country. An outstanding form of male tree of *Ginkgo biloba* is being propagated rapidly. A *Liquidamber styraciflua* tree with excellent shape and very fine fall coloring is in quantity production. Other projects with trees include *Liriodendron*, *Pistacia chinensis*, *Magnolia grandiflora* and *Ceratonia siliqua*. Several forms of *Ceanothus* and *Arctostaphylos* are being propagated extensively. Some *Ceanothus* hybrids are being tested. Other native plants are being studied intensively in an effort to find easier methods of propagation.

Although equipment and space are still somewhat limited, a great deal of progress has been made toward the goal Mr. Hartman and Mr. Van Rensselaer had in mind when the SARATOGA EXPERIMENTAL GARDENS were first established to aid in the improvement of exotic trees and native trees and shrubs for the benefit of the people of the Pacific Coast.

ROSE BREEDING, 1952-1954

HAMILTON P. TRAUB, *California*

The writer had started rose breeding projects before, but due to moving the seedlings were left behind. One of these projects was undertaken in Florida in the 1930's with the objective of providing hybrid tea-type roses that could be maintained indefinitely in that humid subtropical climate. The parents used in these experiments were the hybrid rose, 'Louis Philippe', the CHEROKEE ROSE, *Rosa laevigata* Michx., (pink and white forms), and the MACARTNEY ROSE, *Rosa bracteata* Wendl. All of these maintain themselves indefinitely in Florida and should be the starting point for a race when hybridized among themselves and also with outstanding hybrid tea roses. Some one in Florida should duplicate these crosses which should prove most interesting.

FIRST CALIFORNIA EXPERIMENTS, 1952-1954

During the season 1952 various rose clones were obtained with the objective of breeding mildew resistant roses for California. This disfiguring disease is the bane of the rose grower in this state and frequent sprayings are required to keep the plants healthy. Starting with some mildew resistant clones that are not outstanding for flower size, crosses were made with various outstanding hybrid tea clones at 1531 Rodeo Road, Arcadia, beginning in 1953, and the seeds were harvested in the fall of that year. The seeds were pretreated as recommended by Allen (1951). The seeds were removed from the ripe fruits, and were kept in the refrigerator for several months in 1953-1954 on moist sphagnum peat on the bottom of wide mouth glass containers with perforated screw caps. Unfortunately, this method as used by the writer was not very successful. Mold appeared on the seeds and most of them were destroyed. The sound seeds were planted in pots in the greenhouse. However, out of the entire lot only two seedlings were obtained to start the project.

R-153. A cross between two climbers, 'Blaze' x a mildew resistant clone with pink flowers. The seedling appears to be a vigorous climber

which did not flower during the first season under outdoor culture at 1531 Rodeo Road.

R-253. From the same cross as R-153, but this proved to be a very dwarf plant that produced a single flower when a few weeks old after only a few leaves had been produced, and while still in pot culture in the greenhouse. This phenomenon had been noted before among *Citrus* seedlings which sometimes bloom soon after germination after only a few leaves have been formed. As a rule they do not survive. In the case of R-253, the plant did not die after the flower had faded. The plant was set out in the garden in the spring where it again flowered in August 1954. This time a cluster of three flowers was produced. The flowers in both cases were very small, perfectly double, and light pink in color. Up to the present, the plant is not more than 8 inches tall and was almost lost in September 1954 when the gardener hoed off the top. Fortunately, enough of the lower part remained and it sprouted again in October 1954.

SEED CROP, 1954

During the season 1954, additional rose crosses were made at 1531 Rodeo Road, Arcadia. Since the writer had to leave Arcadia, in the Los Angeles basin, on doctor's orders due to severe smog-induced sinus trouble, the move to La Jolla near the Pacific Ocean was necessary in November 1954. Unfortunately, all of the seeds of the 1954 crop were not fully matured at moving time. The immature fruits were cut with at least 12 inches of stem with leaves attached. These cuttings with fruits were placed in a saran plastic bag. The base of the stems were enclosed in wet sphagnum peat, and the bag was closed. This provided a substitute for a Wardian case. On arrival, some of the fruits were turning red, but were not mature. The cuttings with fruits were removed from the saran bag, and the bases were placed in sphagnum peat in a wooden flat. In this medium most of the fruits matured rapidly with the exception of a few that were quite green when the cuttings were originally made. These latter were left in the flat, and to make certain that too much drying would not take place, they were bent over and most of the stem portions were covered with peat, and one side of each fruit was placed against the moist peat. When this report was written in December 1954 at Camino de la Costa, La Jolla, these fruits were not mature, but one or two were showing a little reddish coloring.

The ripened seeds were refrigerated in December 1954. The method of Boerner (1954) was followed. Some of the seeds were removed from the fruits as controls, but in most cases the seeds were left in the fruits which were frozen in ice cubes in the freezer compartment. There they will be left for a few months and the seeds will then be removed from the fruits and planted in the spring of 1955.

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- Allen, R. C. *Roses for Every Garden*. 1948. p. 174.
[Boerner, E. S.] *Popular Gardening*, June 1954, p. 39.

NEW METHOD FOR DWARFING AND EARLY BEARING IN FRUIT TREES

Justin Brooke, in *Garden Illustrated* (London), LXXI: 198. 1954, reports on his preliminary experiments begun two years ago with a new method for achieving dwarfing and early bearing in fruit trees. The plan is to remove a half-inch band of bark in March or April from the stem of young trees (2 year old) or on two or more branches of older trees, and replacing it "upside down—not inside out, be it noted, but just reversing the bark so that the lower edge is placed at the top of the cut and the upper edge at the bottom." It is then fixed in place with "transparent adhesive tape or any other suitable material." He points out that shoots sometimes develop below the ring, and that these must be removed. Aerial roots may also form sometimes but these may be left as they will die. Brooke cautions that "it must be borne in mind that we are only in the early stages of investigation at present, and it will be some years before final proof of its value or otherwise can be obtained."—Hamilton P. Traub.

CORLISS RACK FOR EXHIBITING FLOWERS

PHILIP G. CORLISS, *M.D.*,
S. W. Reg. Vice-Pres. Somerton, Arizona

There are many reasons why certain flowers entered as specimen exhibits in flower shows should not be placed in containers on tables. Among the most important are:

(a) The flowers should suggest their natural growth and appearance in the garden. If cut at the ground they should be placed with their stem ends close to the floor.

(b) The length of stem is a factor in awarding points when judging some flowers. The stem cut at the ground and placed on a table puts the flowers at such an height that they are not seen as they appear in the garden so that drooping flowers may appear more attractive on the table than outward—or upward-facing flowers (which may thus lose points when judged at this unnatural height).

When, as Exhibition Chairman of The *Hemerocallis* Society, I was deluged with queries as to the proper method of exhibiting daylily scapes, I was forced to design the rack illustrated by the accompanying photographs. ("Necessity is the mother . . ."). Figs. 24 & 25.

The entire rack is made from 1" x 2" wooden strips.

(1) The end frames are 18" square and are reinforced with angle irons. The auxiliary frames are nailed together (may be screwed) and they and all the other pieces are attached to the end frames by bolts. This permits easy dis-assembly for transportation and storage.

(2) The base strips may be bolted to the end frames by a choice of three holes for the end of each strip. This permits variation in the size of the containers which are held between the base strips. The holes are

made to accommodate standard containers such as coca-cola bottles for flowers with narrow stems, milk bottles for large-stemmed flowers, etc.

(3) The guard (side) rails are placed at an height which makes the rack assume good balance—two-thirds to three-fourths of the distance from the floor to the top of the frames is best.

(4) The center (top) strip has holes drilled at one-inch (or wider) intervals, through which the stems are placed and into the containers below. The entry cards may be attached to the top strips opposite the holes selected for the stems. The guard rails protect the entry cards and the specimens and permit the racks to be used in the center of the floor as well as along walls. The length of the strips is optional but ten or twelve feet seems to be the best length for easy transportation and

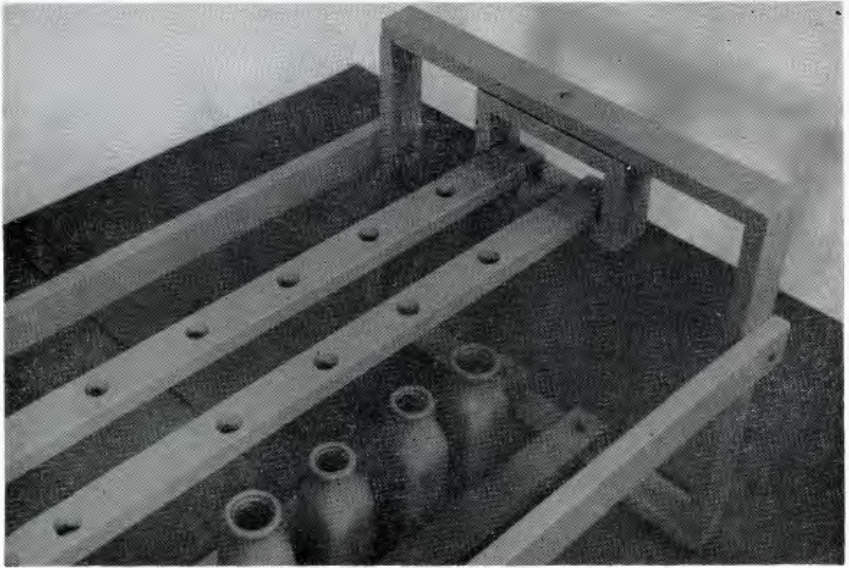


Fig. 24. Corliss rack for exhibiting flowers, showing auxiliary frame attached *below* on the end frame. Photo by Dr. Philip G. Corliss.

storage and to eliminate the use of an additional frame in the center of the strips to support them.

(5) The auxiliary frames are four inches high and six inches wide. They may be attached either below [Fig. 24] or above [Fig. 25] the end frames thus permitting a variation of height of the center strip from approximately 12 to 24 inches from the floor, as the center strip is placed either at the top of the auxiliary frames or in any intermediate position down to suspension from the bottom of the auxiliary frames.

(6) If the number of specimens is large, two center strips may be used. A major objection to the present staging of most flower shows is the crowding of the specimens which results in good view only of those in the front row of containers. The low position afforded by the rack

permits a better view of a double row of specimens than does the table.

(8) Accessory center (top) strips with holes of larger diameter may be used for flowers with thick stems such as amaryllis, gladiolus, and iris. The narrow holes are more suitable for hemerocallis, chrysanthemums, peonies, and climbing roses and other shrubs. Classes calling for three stems may employ three adjacent holes in the center strip with the stems going into the same container.

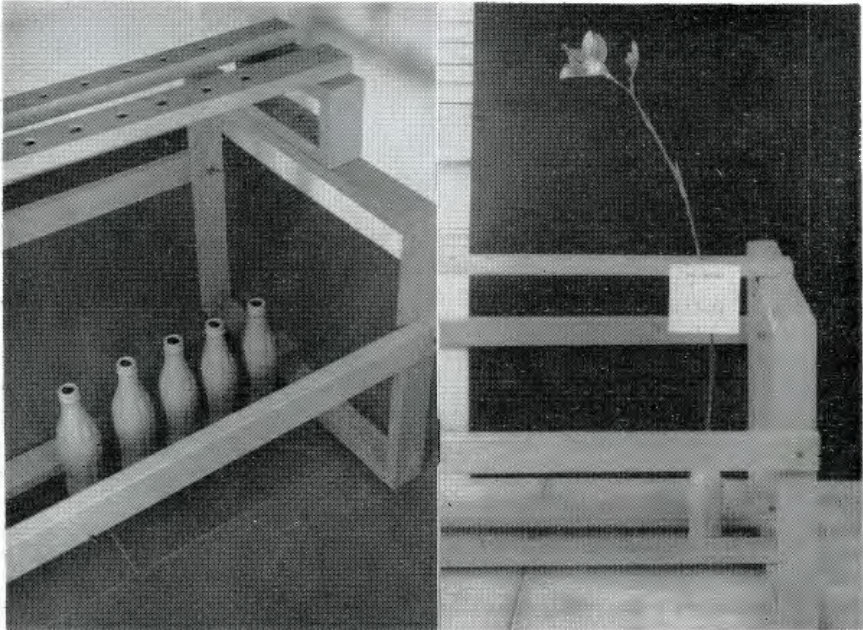


Fig. 25. Corliss rack for exhibiting flowers, showing (at left), auxiliary frame attached *above* the end frame; (at right), one end of the rack with Daylily flower scape in place. Photo by Dr. Philip G. Corliss.

(8) The rack AND all the containers should be painted with a color which provides pleasing harmony or contrast to the flower stems.

The CORLISS RACK may be easily made by anyone. It is not more expensive than the usual cost of labor and covering material required for a single show, yet the racks may be stored and used for an indefinite number of shows. It is hoped that the widespread use of this rack, with improvements that will be made by those who work with it, will result in better shows staged at lower cost and less work by sponsoring groups.

DWARF THYME AS A GROUND COVER

HAMILTON P. TRAUB, *California*

The writer has long ago discarded the usual grass ground cover that needs to be mown often during the summer. He remembers the unwelcome lawn-mowing chore of his childhood that kept him only too often from taking part in the lively base ball game on the city green. As a substitute for the usual grass, he has been experimenting with various ground covers that require infrequent or no mowing. Some of these—Dichondra, Duchesnea, Hedera, and so on—are widely grown in California, but they have certain disadvantages. Dichondra for instance requires too frequent watering; Duchesnea is not always as sightly as it might be, and Hedera provides a heaven for billions of sowbugs, snails, slugs and so on. One of the interesting plants studied by the writer as a ground cover is the low growing *Thymus serpyllum*.

The writer's stock of the dwarf thyme has been grown from seeds obtained from an eastern dealer, but the seedlings show a very wide range from very low growing to several inches high. Apparently the seeds were a mixture of several species. Bailey (1949), in listing *Thymus serpyllum*, states that the species is exceedingly variable, and often is "made to include many of those here treated as species."

The writer has isolated various seedling clones that are maintained by vegetative propagation. The characteristics sought are low, compact growing habit, and deep green foliage. His experiments have been based on these numbered selections.

The main difficulty experienced with *Thymus serpyllum* as a ground cover is due to the fact that it blooms in July and August in California, and the flower heads must be clipped early before they set seeds. If clipped too late, the plants make a bare, unsightly appearance for a time before new growth appears. Thus it appeared that dwarf thyme was not a perfect ground cover that could be grown without mowing at least a few times each summer. However, some of the seedlings turned out to be sterile, and this may solve the mowing problem. In the cases of sterility observed, the flowers are borne on very short heads, but no seeds are set. The flower heads soon wither and the plants remain green during the entire flowering season, and also during the rest of the year. Selections Th-153 and Th-253 have been vegetatively propagated for the making of thorough trials.

It is still too early to reach a final conclusion about the value of the sterile dwarf clones as ground covers which do not require frequent mowing. Other progress reports will be published in later issues of Plant Life.

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Bailey, L. H. Manual of Cultivated Plants. Macmillan. 1949.

THE GENUS **IPHEION**: DIAGNOSIS, KEY TO SPECIES AND SYNONYMY

HAMILTON P. TRAUB AND HAROLD N. MOLDENKE

The species *Ipheion uniflorum* (Lindl.) Rafin., the type of the genus *Ipheion* Rafin., has had a checkered career. It has been assigned to no less than seven genera at one time or another,—*Triteleia*, *Ipheion*, *Milla*, *Brodiaea*, *Leucocoryne*, *Hookera* and *Beauverdia*. Its status was somewhat clarified when Hoover (1939; 1940; and 1941) published his revision of the North American relatives of *Ipheion uniflorum*, and also showed that these North American species belong mostly to the genera *Brodiaea*, *Dichelostemma* and *Triteleia*. Hoover pointed out that the genus *Triteleia* Douglas ex Lindl., was founded in 1830 on the basis of material from North America that was furnished to Lindley by Douglas: that three species were included (1) *T. bivalvis*, and (2) *T. uniflora*, both from South America, and (3) *T. grandiflora*, from North America; that, according to Lindley, the genus was “marked in Mr. Douglas’ papers *Triteleia*, which we suspect is a name furnished to him by Dr. Hooker”; that the plant of Douglas naturally would be *T. grandiflora*, which he collected, rather than one of the South American species which Lindley added to the same genus. Thus it is clear that neither *I. uniflorum*, or *I. bivalve* could be the type of the genus *Triteleia*.

Beauverd (1908) presented an historical outline of the genus *Nothoscordum* Kunth. He classified the recognized species under two sections—Sect. *Uniflora* Beauv. (including among others, *Triteleia uniflora* Lindl.), and Sect. *Umbelliflorum* Beauv., centering around *N. bivalve*. Herter (1943) raised the sect. *Uniflorum* to generic rank under the name, *Beauverdia* Herter. Traub (1954) presented an emended diagnosis, a key to the species and the synonymy of the residual Sect. *Umbelliflorum* under the original generic name, *Nothoscordum* Kunth. Stearn (1943) pointed out that the name, *Ipheion* Rafin., (1837), with *Triteleia uniflora* Lindl., as the type, has priority over the name, *Beauverdia* Herter (1943). He accordingly restored the former generic name, and presented a detailed generic diagnosis. He also recognized five forms under *Ipheion uniflorum*.

Since descriptions in English are now available for all *Ipheion* species, the urgent needs for Plant Life readers are an emended diagnosis of the genus, a key to the 23 species, and their synonymy, which are presented in the present paper.

It should be noted that in the key, the species have been grouped under two sections—

- 2a. (of the key). Tepaltube very short, less than 4 mm. long; type: *I. bivalve* (Lindl.) Traub Section 1.
 2b. (of the key). Tepaltube 4.5—39 mm. long; type:
I. uniflorum (Lindl.) Rafin Section 2.

It should be noted that these two groups practically grade into each other, the campanulate perigone being usually associated with a short tepaltube (Sect. 1), and the longer flower shape with the relatively longer tepaltube, up to 39 mm. long (Sect. 2).

Genus *IPHEION* Rafin.

Fl. Tellur. II, 12. 1837; syn.—*Nothoscordum* sect. *Uniflorum* Beauv., in Bull. Herb. Boiss. (2) VIII, 1006. 1908; *Beauverdia* Herter, in Boissiera VII, 507. 1943.

DIAGNOSIS.—Bulbous perennials with or without an alliaceous smell; *bulb* with membranous tunics; *leaves* linear, narrowly linear, or narrowly lanceolate with nearly flat or flat surfaces, or canaliculate, rarely terete or filiform; *peduncle* leafless; *umbel* 1—8-flowered; *spathe* 2-valved, united for part of its length below, the valves linear, linear-lanceolate, lanceolate, elliptic-acuminate, elliptic-lanceolate, ovate-lanceolate, or ovate-lanceolate-acuminate; ovary sessile or pedicellate, the *pedicel*, if present, not articulated below the ovary; *flower* white, whitish, white-striped-violet, white keeled green or red, greenish-white, green, pale yellow, golden yellow, pale lilac, lilac or violet; *ovary* tri-locular, each *locule* with several *ovules*; *tepaltube* cylindric, funnel-shaped, obconic, sub-campanulate or campanulate, well-developed, 4.5—39 mm. long, or very short and less than 4 mm. long; *tepalsegs* 6, linear, narrowly-linear, lanceolate-acuminate, elliptic, elliptic-acute, lanceolate-spatulate, oblong-lanceolate, oblong-acute, oblong-spatulate, ovate-acute or rounded-spatulate; *stamens* 6, arranged in two series, rarely at one level, below the mouth on the inside of the tepaltube, or rarely near its mouth; *filaments* slender, filiform, filiform-flattened below, or subulate; *anthers* oblong, versatile; *style* filiform, or rarely thick and short; *stigma* minutely 3-lobed or capitate; *fruit* a trilocular capsule.

SYSTEMATIC POSITION: *Amaryllidaceae*, tribe *Allieae*, Hutchinson (1934), near *Nothoscordum* and *Tristagma*.

DISTRIBUTION: twenty-three species in Uruguay, Argentina and Chile.

TYPE SPECIES: *Ipheion uniflorum* (Graham) Rafin., Fl. Tellur. II, 12. 1837. = *I. uniflorum* (Lindl.) Rafin.

KEY TO THE SPECIES OF *IPHEION*

- 1a. Tepaltube very short, less than 4 mm. long (Section 1. type: *I. bivalve* (Lindl.) Traub):
 - 2a. Perigone white, whitish-violet and whitish-violet nerved, or white, red-keeled, or violet:
 - 3a. Umbel 2—6-flowered:
 - 4a. Filaments linear, 6 mm. long, tepalsegs oblong-lanceolate (Chile)
 1. *violaceum*
 - 4b. Filaments flattened downwards, 3 mm. long, tepalsegs oblong-spatulate (Chile) 2. *bivalve*
 - 3b. Umbel 1-flowered:
 - 5a. Pedicels 3-6 mm. long:
 - 6a. Filaments filiform (Argent.) 3. *setaceum*
 - 6b. Filaments subulate (Argent.) 4. *lloydii*florum
 - 5b. Pedicels 13—25 mm. long (Uruguay) 5. *vittatum*
 - 2b. Perigone golden yellow:
 - 7a. Pedicels 1—2 mm. long (Uruguay) 6. *hirtellum*
 - 7b. Pedicels 6—10 mm. long:
 - 8a. Tepalsegs 19 mm. long (Uruguay) 7. *felipponei*

- 8b. Tepalsegs 10—15 mm. long:
 9a. Tepalsegs elliptic (Argent.) 8. *lorentzii*
 9b. Tepalsegs oblong-spathulate (Uruguay) 9. *sellowianum*
- 1b. Tepaltube relatively longer, 4.5—39 mm. long (Section 2. type: *I. uniflorum* (Lindl.) Rafin.):
- 10a. Umbel 4—8-flowered:
 11a. Filaments filiform (Chile) 10. *poepigianum*
 11b. Filaments subulate (Chile) 11. *porrifolium*
- 10b. Umbel 1—3-flowered:
 12a. Leaves up to 1.5 mm. wide. (tepaltube 6—10 mm. long):
 13a. Pedicels 12—18 mm. long (Argent.) 12. *patagonicum*
 13b. Pedicels 5—8 mm. long, or ovary sessile:
 14a. Perigone 10—12 mm. long, ovary pedicellate:
 15a. Tepalsegs linear (Argent.) 13. *speggazinii*
 15b. Tepalsegs oblong-spathulate (Uruguay & Argent.) 14. *tweedianum*
 14b. Perigone 18—20 mm. long, ovary sessile (Chile) 15. *sessile*
- 12b. Leaves 2—12 mm. wide, (tepaltube 8—39 mm. long):
 16a. Peduncle 2—30 cm. tall:
 17a. Tepaltube 8—13.3 mm. long:
 18a. Ovary pedicellate, pedicels 10—30 mm. long:
 19a. Tepalsegs linear or narrowly-linear, leaves 2—3 mm. wide:
 20a. Style filiform, 3 mm. long, flowers green (Chile) 16. *nivale*
 20b. Style rather thick, 3 mm. long, flowers greenish-white (argent.).
 17. *ameghinoi*
 19b. Tepalsegs oblong-lanceolate, leaves 5—12 mm. wide (Argent.)
 18. *viridor*
 18b. Ovary sessile (Argent.) 19. *circinatum*
- 17b. Tepaltube 15—39 mm. long:
 21a. Pedicels 25—51 mm. long:
 Flowers pale lilac, lilac, violet or white, umbel 1—3-flowered (Argent.)
 20. *uniflorum*
 21b. Pedicels 1—11 mm. long:
 22a. Umbel 2-flowered (Chile) 21. *gracile*
 22b. Umbel 1-flowered (Uruguay) 22. *recurvifolium*
- 16b. Peduncle scarcely rising above the ground:
 Umbel 1—3-flowered, flowers white, keeled green (Chile) 23. *brevipes*

SPECIES NAMES AND SYNONYMY

1. IPHEION VIOLACEUM (Kunth) Traub, in *Plant Life* 9: 69. 1953.
 Syn.—*Triteleia violacea* Kunth, *Enum. Pl. 4*: 468. 1843; *Milla violacea* Baker, in *Jour. Bot. Lond.* 12: 5. 1874.
2. IPHEION BIVALVE (Lindl.) Traub, in *Plant Life* 9: 69. 1953.
 Syn.—*Triteleia bivalvis* Lindl., in *Bot. Reg.* 15: sub pl. 1293, in adnot. 1830; Kunth, *Enum. Pl. 4*: 468. 1843; C. Gay, *Fl. Chil.* 6: 117. 1853; *Triteleia gaudichaudiana* Kunth, *Enum. Pl. 4*: 467. 1843; *Milla bivalvis* Baker, *Jour. Linn. Soc. Bot.* 11: 386. 1871.
3. IPHEION SETACEUM (Baker) Traub, in *Plant Life* 9: 69. 1953.
 Syn.—*Milla setacea* Baker, in *Jour. Linn. Soc. Bot.* 11: 385. 1871.
4. IPHEION LLOYDIIFLORUM (Beauv.) Traub, in *Plant Life* 5: 50. 1949. Syn.—*Nothoscordum lloydii* Beauv., in *Bull. Herb. Boiss. ser. 2*: 8: 998, fig. 2. 1908; *Beauverdia lloydii* (Beauv.) Herter, in *Boissiera* 7: 510. 1943.
5. IPHEION VITTATUM (Griseb.) Traub, in *Plant Life* 5: 50. 1949.
 Syn.—*Milla vittata* Griseb., in *Goett. Abh.* 24: 318. 1879; *Brodiaea*

vittata Baker, in Gard. Chron. ser. 3, 20: 459. 1896; *Beauverdia vittata* (Griseb.) Herter, in Boissiera 7: 511, fig. 55, left. 1943.

6. IPHEION HIRTELLUM (Kunth) Traub, in Plant Life 5: 50. 1949. Syn.—*Triteleia hirtella* Kunth, Enum. Pl. 4: 465. 1843; *Milla hirtella* (Kunth) Baker, in Jour. Linn. Soc. Bot. 11: 385. 1871; *Brodiaea hirtella* (Kunth) Baker, in Gard. Chron. ser. 3, 20: 459. 1896; *Nothoscordum canescens* Beauv., in Bull. Herb. Boiss. ser. 2. 8: 997, fig. 1-A-D. 1908; *Nothoscordum subsessile* Beauv., in Bull. Herb. Boiss. ser. 2. 8: 997, fig. 1-E-H. 1908; *Nothoscordum hirtellum* (Kunth) Herter, in Ind. Sem. Montev. 1928-1929; *Beauverdia hirtella* (Kunth) Herter, in Boissiera 7: 509. 1943; *Beauverdia subsessilis* (Beauv.) Herter, in Boissiera 7: 510. 1943; *Ipheion subsessile* (Beauv.) Traub, in Plant Life 5: 50. 1949.

7. IPHEION FELIPPONEI (Beauv.) Traub, in Plant Life 5: 50. 1949. Syn.—*Nothoscordum felipponei* Beauv., in Bull. Soc. Bot. Geneve, ser. 2. 13: 267. 1921; *Brodiaea felipponei* (Beauv.) Herter, in Flor. Urug. 2: 47. 1930.

8. IPHEION LORENTZII (Herter) Traub, in Plant Life 5: 50. 1949. Syn.—*Beauverdia lorentzii* Herter, in Boissiera 7: 509, fig. 54. 1943.

9. IPHEION SELLOWIANUM (Kunth) Traub, in Plant Life 5: 50. 1949. Syn.—*Triteleia sellowiana* Kunth, in Enum. Pl. 4: 466. 1843; *Milla sellowiana* (Kunth) Baker, in Jour. Linn. Soc. Bot. 11: 383. 1871; *Brodiaea sellowiana* (Kunth) Baker, in Gard. Chron. Lond. ser. 3, 20: 459. 1896; *Nothoscordum ostensii* Beauv., in Bull. Herb. Boiss. ser. 2. 8: 996, fig. 1-J-M. 1908; *Beauverdia sellowiana* (Kunth) Herter, in Boissiera 7: 510. 1943.

10. IPHEION POEPPIGIANUM (C. Gay) Traub, in Plant Life 9: 69. 1953. Syn.—*Triteleia poeppigiana* C. Gay, in Fl. Chil. 6: 117. 1853; *Milla poeppigiana* (C. Gay) Baker, in Jour. Linn. Soc. Bot. 11: 383. 1871; *Brodiaea poeppigiana* (C. Gay) Kurtz, in Bol. Acad. Nac. Cienc. Cordoba, 13: 199, 202. 1893; Baker, in Gard. Chron. ser. 3, 20: 459. 1896; Macloskie, in Rept. Princeton Univ. Exped. 8(1) Bot.: 305. 1903—06.

11. IPHEION PORRIFOLIUM (Poepp.) Traub, in Plant Life 9: 69. 1953. Syn.—*Triteleia porrifolia* Poepp., in Fragm. synop. Pl. Phan. Chil. 10. 1833; Kunth, Enum. Pl. 4: 468. 1843; Poepp. & Endl., Nov. Gen. et Sp. 2: 28, pl. 139. 1835; C. Gay, Fl. Chil. 6: 118. 1853; *Milla porrifolia* (Poepp.) Baker, in Jour. Linn. Soc. Bot. 11: 386. 1871; Refug. Bot. 4: pl. 258. 1871; Hooker, in Bot. Mag. Lond. 98: pl. 5977. 1872; *Brodiaea porrifolia* (Poepp.) Meigen, in Engler, Bot. Jahrb. 17: 225. 1893; Fuentes, in Bol. Mus. Nac. Chil. 12: 110, fig. 2. 1929.

12. IPHEION PATAGONICA (Baker) Traub, in Plant Life 9: 69. 1953. Syn.—*Milla patagonica* Baker, in Jour. Linn. Soc. Bot. 11: 383. 1871; *Brodiaea patagonica* (Baker) Baker, in Gard. Chron. ser. 3, 20: 459. 1896.

13. IPHEION SPEGAZZINII (Macloskie) Traub, in Plant Life 9: 69. 1953. Syn.—*Brodiaea patagonica* Speg., in Rev. Facult. Agron. Vet. La Plata 3: 576—577. 1897, err. 1896, non Baker, 1871 (cf. Speg. Pl. Pat. Austr. June 1897); type: Speg. no. 362; *Triteleia uniflora* Hier., Sert. Pat. fig. 53, no. 146, non Lindl., in part (cf. Speg. l. c. 1897), in synonym;

Triteleia patagonica (Speg.) Speg., in Nova Addenda ad floram Pat. III. no. 584. 1902 (type: Speg. no. 362, err. no. 366); *Brodiaea spegazzinii* Macloskie, in Rept. Princeton Univ. Exped. Pat. 8: 305. 1903-06 (type: Speg. no. 362); *Brodiaea luzula* (Speg.) Macloskie, l. c., 1903-06 (type: Speg. no. 362, err. no. 366, cf. Hausman, in Physis 3: 423-426. 1917; Moldenke, in Plant Life 11: 62-63. 1955; *Ipheion luzula* (Speg.) Traub, in Plant Life 9: 69. 1953 (type: Speg. no. 362, err. no. 366).

14. IPHEION TWEEDIANUM (Griseb.) Traub, in Plant Life 5: 50. 1949. Syn.—*Milla tweediana* Griseb., in Goett. Abh. 24: 318. 1879; *Beauverdia tweediana* (Griseb.) Herter, in Boissiera 7: 512, fig. 53. 1943.

15. IPHEION SESSILE (Phil.) Traub, in Plant Life 9: 69. 1953. Syn.—*Triteleia sessilis* Phil., Linnaea 29: 72. 1857—58; *Milla sessiliflora* Baker, in Jour. Linn. Soc. Bot. 11: 382. 1871; *Brodiaea sessilis* (Phil.) Meigen, in Engler, Bot. Jahrb. 17: 225. 1893; *Brodiaea sessiliflora* (Baker) Baker, in Gard. Chron. ser. 3, 20: 459. Oct. 1896.

16. IPHEION NIVALE (Poepp.) Traub, in Plant Life 9: 69. 1953. Syn.—*Tristagma nivalis* Poepp., in Poepp. & Endl. Nov. Gen et Sp. 2: 28, pl. 140. 1835; C. Gay, in Fl. Chil. 6: 125. 1853; *Milla nivalis* (Poepp.) Baker, in Jour. Linn. Soc. Bot. 11: 383. 1871; *Brodiaea nivalis* (Poepp.) Baker, in Gard. Chron. ser. 3, 20: 459. Oct. 1896.

17. IPHEION AMEGHINOI (Speg.) Traub, in Plant Life 9: 69. 1953. Syn.—*Brodiaea ameghinoi* Speg., in Rev. Facult. Agron. Vet. La Plata 3: 575—576. 1897, err. 1896.

18. IPHEION VIRIDOR (Killip) Traub, in Plant Life 9: 69. 1953. Syn.—*Brodiaea viridor* Killip, in Jour. Wash. Acad. Sci. 16: 566. 1926.

19. IPHEION CIRCINATUM (Sandwith) Traub, in Plant Life 9: 69. 1953. Syn.—*Brodiaea circinata* Sandwith, in Hook. Ic. Pl. 5th. ser., 4: pl. 3350. 1937.

20. IPHEION UNIFLORUM (Lindl.) Rafin., in Fl. Tellur. II. 2. 1837; Stearn, in Gard. Chron. ii (1943) 60—61, fig. 32. Syn.—*Triteleia uniflora* Lindl., in Bot. Reg. Lond. 15: sub pl. 1293, in nota. 1829; 23: pl. 1921. 1837; Flore des Serres, 9: pl. 967. 1854; *Milla uniflora* Graham, in Edinb. New Phil. Jour. 14: 174-175. 1833; *Triteleia conspicua* Baker, in Saund. Bot. Refug. 1: 61, pl. 43. 1868; *Milla bonariensis* Gillies ex Baker, in Lour. Linn. Soc. Bot. 11: 382. 1871, in synonym.; *Brodiaea uniflora* (Lindl.) Engl., in Engl. & Prantl Nat. Pflanzenfam. 2(5): 57. 1887; Baker, in Gard. Chron. ser. 3, 20: 459. Oct. 1896; *Leucocoryne uniflora* (Lindl.) Green (1890); *Hookera uniflora* (Lindl.) O. Kuntze (1891); *Beauverdia uniflora* (Lindl.) Herter, in Boissiera 7: 512, fig. 55, right. 1943.

21. IPHEION GRACILE (Phil.) Traub, in Plant Life 9: 69. 1953. Syn.—*Triteleia gracilis* Rhil., in Anal. Univ. Chil. 550. 1875; *Brodiaea philippiana* Baker, in Gard. Chron. ser. 3, 20: 459. Oct. 1896; *Brodiaea gracilis* (Phil.) Fuentes, in Bol. Mus. Nac. Chil. 12: 110. 1929.

22. IPHEION RECURVIFOLIUM (C. W. Right) Traub, in Plant Life 9: 69. 1953. Syn.—*Brodiaea recurvifolia* C. H. Wright, in Bull. Misc. Inf. Kew. 117. 1915.

23. *IPHEION BREVIPIES* (Kunze) Traub, in *Plant Life* 9: 69. 1953. Syn.—*Triteleia brevipes* Kunze, in *Linnaea* 20: 9. 1847; *Milla brevipes* (Kunze) Baker, in *Jour. Linn. Soc. Bot.* 11: 386. 1871; *Milla leichtlinii* Baker, in *Gard. Chron. Lond.* i (1875) 234; *Bot. Mag. Lond.* 102: pl. 6236. 1876; *Brodiaea leichtlinii* (Baker) Baker, in *Gard. Chron. ser. 3*, 20: 459. Oct. 1896.

DOUBTFUL SPECIES

TRITELEIA GRAMINIFOLIA (Bert.) Presl, in *Abh. Boehm. Ges. Wiss.* V. 3: 116. 1844. According to Presl, *Bulbocodium graminifolium* Bert., native to Chile, belongs in the genus *Triteleia*. If this species can be authenticated, it will apparently come either under *Nothoscordum* Kunth or *Ipheion* Rafin.

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OUTLINE — GARDENING PROGRAM IN THE CLEVELAND PUBLIC SCHOOLS

[The following outline was written by Paul R. Young, SUPERVISOR OF SCHOOL GARDENS, CLEVELAND PUBLIC SCHOOLS. It is published so that it may be available generally for use in public schools.—*Editor*]

THE DIVISION OF SCHOOL GARDENS is an Auxiliary Agency in the CLEVELAND SCHOOL SYSTEM. It exists to aid teachers and pupils in the conduct of educationally desirable and effective experiences in gardening. Its program toward that end is set forth in this outline.

A. REGULAR SCIENCE COURSE-OF-STUDY UNITS IN GARDENING

(Prepared by Garden Division, and serviced with teaching materials.)

Grade III. How Can We Plant and Grow a Beginner's Garden?

Grade IV. How Can We Make a Garden?

Grade V. How Can We Have a Successful Garden Exhibit?

Grade VI. How Can We Take Care of a Small Garden?

Grade VII. Gardening, Why, Where, How?

Grade VIII. Gardening for Home Improvement.

Grade IX. Gardening—Plants in the Service of Man.

B. VOLUNTARY PROJECT PROGRAM IN GARDENING

Following is an outline of the projects in gardening made available, on a voluntary basis, to teachers and pupils in the schools. Each school decides whether or not it wishes to participate, and requests the projects desired, on blanks furnished at the appropriate times by the Garden Division. Supplies are delivered to the schools, and are furnished without cost (up to a reasonable maximum) for most of the school projects. Pupils pay an enrollment fee for the individual home projects, to cover the cost of seeds, fertilizer, plants, etc., furnished them through the schools. Outlines of information and suggestions for teachers are provided for each project, by the Garden Division.

Kindergarten. SEED SOWING AND PLANT GROWING; CORN: Seeds, soil, individual plant bands, and plantrays to hold them, are furnished for each child to plant and grow his own plant. A *classroom* project.

Grade I. SEED SOWING AND PLANT GROWING; SUNFLOWERS: Similar to the kindergarten project, using sunflower seeds instead of corn. A *classroom* project.

Grade II. SEED SOWING AND PLANT GROWING; TOMATOES: Similar to the kindergarten project, using tomato seeds instead of corn. A *classroom* project.

Grade III. GROWING PAPER WHITE NARCISSUS IN BOWLS: Bulbs, gravel, and bowls are provided, sufficient to allow each participating class to plant 8 bowls of 3 paper white narcissus, to be brought into flower in the school. A *classroom* project. BEGINNER'S GARDENS: Small children's gardens (4 by 5 feet) for which a plan, seeds, plants,

and onion sets are furnished for a nominal enrollment fee, paid by children who wish to enroll. An *individual home* project supervised by one home visit during the summer.

Grade IV. CARING FOR PLANTS IN THE SCHOOL: An educational project in caring for plants purchased for decorative purposes in the school. (See section C, Service Projects, on the next page of this outline.) A *school* and *classroom* project. HOUSE PLANTS FOR THE HOME: Rooted English ivy cuttings, pots, and soil are provided so that each pupil in participating classes can pot an ivy plant to take home. A *classroom* project. HOME GARDEN PROJECTS, REGULAR SERIES: Vegetable and flower gardens planned for children, with seeds, plants, and fertilizer furnished to pupils who pay the small enrollment fee. *Individual home* projects, supervised by two home visits during the summer.

Grade V. POTTING BULBS FOR SPRING BLOOM: Pots, soil, and bulbs are provided sufficient to plant two pots of tulips and two of daffodils, for each class above the primary division. Extra bulbs and pots (including hyacinths) can be purchased at cost, to extend this project. Potted bulbs are stored at school garden centers, for rooting during winter, and taken back to the schools in early spring. A *classroom* project. BULBS FOR HOME FLOWERING: Pupils may enroll and for a small fee receive a bowl of gravel and 3 paper white narcissus bulbs for flowering at home. An *individual home* project. (Also available to Grade VI.) HOME GARDEN PROJECTS, REGULAR SERIES: As described for Grade IV. *Individual home* projects, supervised by two home visits during the summer.

Grade VI. MAKING NEW PLANTS FROM SOFTWOOD CUTTINGS: Cutting stock, boxes and sand, pots, and soil are provided to allow each pupil in participating classes to make several cuttings, and pot them for taking home, after they are rooted. A *classroom* project. HOME GARDEN PROJECTS, REGULAR SERIES: As described for Grade IV. *Individual home* projects, supervised by two home visits during the summer.

Grades VII through XII. HOME GARDEN PROJECTS, REGULAR SERIES, PLUS SPECIAL PROJECTS WITH CHRYSANTHEMUMS, GLADIOLUS, AND ROSES: As described for Grade IV. *Individual home* projects, supervised by two home visits during the summer. POTTING BULBS FOR SPRING BLOOM: Bulbs, pots, soil, etc., furnished for junior and senior high science class potting, as for Grade V. A *classroom* project. SPECIAL TECHNICAL, OCCUPATIONAL, AND AVOCATIONAL COURSES IN HORTICULTURE: At WEST TECHNICAL HIGH SCHOOL, THOMAS EDISON OCCUPATIONAL SCHOOL, BENJAMIN FRANKLIN SCHOOL GARDEN, MEMORIAL SCHOOL GARDEN, and HARVEY RICE SCHOOL GARDEN, horticulture courses for secondary pupils are offered.

All Grades. SCHOOL GARDEN TRACTS: At 6 school garden centers individual garden plot projects are made available to pupils ranging from kindergarten through high school. For a nominal fee

pupils may enroll and be assigned a plot; work is done under teacher direction on an all-summer schedule, except for kindergarten and primary gardeners, whose work ends with the school semester. All produce belongs to the pupils. These centers are operated in conjunction with the following schools but pupils from other accessible schools participate: BENJAMIN FRANKLIN, HARVEY RICE, H. W. LONGFELLOW, KENTUCKY, MILES, and WADE PARK.

C. SPECIAL SERVICE PROJECTS FOR SCHOOLS, TEACHERS, AND PUPILS

Plants for School Decoration. Principals are privileged to order specified plants useful and feasible for school conditions, at cost prices. Plants are purchased in small sizes in spring, grown on at Garden Division Greenhouses (WEST TECH) and delivered to schools after opening of fall semester.

Teacher Workshops. A series of 4 or 5 practical projects in gardening is made available to all teachers and other school personnel, each school year. Material costs are borne by participants. East and West side groups; meet Saturday mornings, for the most part.

Christmas Decorations. Supplies for desirable Christmas corsages, table pieces, and/or door swags are offered as pupil projects for the Holiday Season. Pupils pay enrollment fees to cover costs of materials. Work is done in classroom groups.

School Yard Planting. A number of the teaching staff of the Garden Division is assigned to the development of school yard improvement projects on an educational basis, in cooperation with principals, teachers and pupils, and with the Business Department. This service is rendered on request to the Garden Division office, in the order in which requests are received, and as rapidly as projects can be handled, utilizing both the spring and fall planting seasons.

D. CLASSES FOR ADULTS

A program of classes in gardening, and flower arrangement, is carried on at various school garden centers, in cooperation with the Division of Adult Education. A fall semester and a spring semester, of 10 weeks each, are offered. Classes meet in the evening, with the exception of one or two afternoon groups in flower arrangement. Regular fees are charged, in accordance with the schedule for other adult classes. Garden Division teachers are in charge.

One or more of these classes are offered at the following gardens: BENJAMIN FRANKLIN, HARVEY RICE, MEMORIAL, and WEST TECH Greenhouse.

[See also article, "Gardening in the Cleveland Public Schools," by John F. Cooke, Jr., which appears in 1955 *Herbertia*.—*Editor*]

PLANT LIFE LIBRARY

PLANT GROWTH SUBSTANCES, by L. J. Audus. Interscience Publ., 250 5th Av., New York. 1953. pp. 465. \$6.50.

This comprehensive manual on plant growth regulating substances was written "for all classes of reader, for the non-scientific layman who spends his week-ends in his garden as well as the agriculturist, the chemist and plant physiologist who are more directly concerned with the production and use of these chemicals." Dr. Audus has achieved a proper balance between the presentation of theoretical principles and practice since "an attempt has been made to cover every practical aspect of growth substance application yet . . . only the briefest of references [are] made to ultimate details of technique, rates of application, etc." The subjects treated include (1) the nature of plant growth and its control, (2) the nature of auxins, (3) the chemistry of auxins—natural and synthetic, (4) auxins as general growth stimulants, (5) use of auxins in rooting of cuttings, grafting and wound healing; as initiators and stimulators of fruit development, (6) use of auxins as growth inhibitors—induced dormancy, selective weed killers, (7) auxins and tissue differentiation, (8) applications of auxins in fruit ripening, initiation of flowering, prolonging of flower blooming, use in blossom thinning, relation to bolting in vegetables, crotch-angle strengthening in fruit trees, (9) hormones and reproduction, (10) specific factors for the growth of organs, (11) natural growth inhibitors, and (12) growth substance in soil. There are a glossary of terms, and appendices on responses of cuttings to auxin treatment; auxins and fruit setting in tomatoes, and other fruits; hormone herbicides, and hormones and the pre-harvest drop in apples; an excellent bibliography, and index.

Dr. Audus is to be congratulated in producing a most valuable synthesis of the vast data on this subject reported in the literature, including his own researches and those of his students. This is positively a book that all who are in any way concerned with plant growth regulators must have, including the intelligent layman gardeners, the agriculturists as well as the scientific workers.

PLANT REGULATORS IN AGRICULTURE, by H. B. Tukey, Editor. John Wiley & Sons. 440 4th Av., New York. 1954. pp. 269. \$5.50.

The broad term, plant regulators, as defined in this book, includes both the plant hormones and other—usually synthetic—regulators that have been found useful in present day agriculture. This book by 17 authorities in the field of plant regulators has been "prepared for the many who have been puzzled . . . at their seeming inability to grasp the significance of plant regulators, what they are, how they operate, and where they belong in agriculture." It "is not intended as a handbook of recommended practices, but rather to provide background material, particularly for county agricultural agents, advanced high school students, college students and interested business and professional workers." It is indicated that due to space limitations, "It has been necessary to omit much excellent material" and "general statements have been resorted to in the interests of clarity and brevity," but enough of the basic

facts are presented "for the reader to build upon." There is a real need for such an introductory book, and the authors of the 16 rather brief chapters have succeeded in giving an adequate outline of the subject matter concerning plant regulators. It is therefore required reading for all who are interested in this field.

OUTLINES OF ENZYME CHEMISTRY, by J. B. Neilands, P. K. Stumpf, and R. Y. Staner. John Wiley & Sons, 440 Fourth Av., New York. 1955. pp. 315. illus. \$6.50.

This concise treatise was written "to introduce senior undergraduate and beginning graduate students to the general subject of enzyme chemistry, and to provide background material for research workers in fields other than enzymology." The subject is treated in "outline form so that the reader may acquire a clear and useful understanding of enzyme chemistry as a whole." The four parts of the book are devoted to (1) general principles, (2) physical chemistry of enzymes, (3) types of coenzymes and enzymes, and (4) metabolic patterns. This clearly written text is highly recommended.

ELEMENTS OF ECOLOGY, by George L. Clarke. John Wiley & Sons, 440 4th Av., New York. 1954. pp. 534. Illus. \$7.50.

Although this introductory book on ecology was "written primarily for students of ecology," it also presents background material for "those interested in conservation, forestry, agriculture, fisheries, wildlife management and other branches of applied ecology." It stresses the "unity of ecology and the necessity for including the influences of both plants and animals as well as the physical forces as part of the environment." In the presentation, the "principal factors of the physical environment, such as water, temperature and light, are treated individually before their combined action is discussed." This excellent, easily readable text is very highly recommended.

THE PRACTICE OF SILVICULTURE, by R. C. Hawley and D. M. Smith. 6th ed. John Wiley & Sons, 440 4th Av., New York. 1954. pp. 525. Illus. \$7.50.

This completely rewritten and greatly expanded 6th edition of a standard book on silviculture gives "expression to new knowledge and modern interpretations of old principles," and is intended primarily for use in forestry schools in the United States and Canada. The subjects covered include reproduction methods, the clearcutting method, seed-tree method, shelterwood method, selection method, vegetative reproduction methods, artificial reproduction methods, slash disposal and salvage cuttings, pruning and methods of controlling cuttings. This excellent text is indispensable to all students and workers in forestry.

GEOGRAPHY OF NORTH AMERICA, by G. J. Miller, A. E. Parkins and Bert Hudgins. 3rd ed. John Wiley & Sons, 440 4th Av., New York. pp. 664. Illus. 1950. \$7.50.

Since this 3rd edition of a standard work is designed as a basic textbook, the authors' purpose is to present only the more general and basic materials, leaving the more detailed presentation and study to the instructor and student. The central theme of the book is the occupation

of the North American continent by immigrants, the utilization of the available resources by the newcomers, the opportunities that are still available to them, and what effect the utilization of the resources had had on their social, political and economic life. The four parts of the book are concerned with (1) the North American Continent, (2) the United States and Alaska, (3) Canada, and (4) Mexico and Middle America. This easily readable book is highly recommended.

A PRACTICAL MANUAL OF MEDICAL AND BIOLOGICAL STAINING TECHNIQUES, by Edward Gurr. Interscience Publ., 250 5th Av., New York. 1954. pp. 320. \$4.00.

This book has been written as "a practical manual dealing with . . . most branches of microscope staining, entirely divorced from theory and general statements," and is intended to serve as a useful supplement to the standard works in the field of biology. The six sections are devoted to (1) fixation, dehydration, clearing, embedding, sectioning, etc., (2) animal histology, (3) botanical methods, (4) cytological methods, (5) fluorescence methods, and (6) smear preparations. Formulae, conversion tables, etc., are presented in the Appendix. The index is ample. This outstanding book is indispensable to those interested in microscope staining techniques.

TAXONOMIC TERMINOLOGY OF THE HIGHER PLANTS, by H. I. Featherly. Iowa State College Press. Ames, Ia. 1954. pp. 166. \$3.75.

This concise reference book was written for students of taxonomy, plant distribution, and speciation, especially of the higher plants—Pteridophyta and Spermatophyta. About half of the book is devoted to a glossary of terms which according to the author is considered "ample but intentionally not exhaustive . . . obsolete and seldom used words have been omitted purposely." In addition there are sections on (1) subject classification, (2) specific epithets with their meanings, (3) Greek and Latin components of specific words, (4) floral evolution and laws, theories having direct or indirect bearing on taxonomy, distribution or speciation; and (5) bibliography.

THE PHILOSOPHY OF SCIENCE, by Stephen Toulmin. Longmans, Green & Co. 55 5th Ave., New York. 1953. pp. 176. illus. Text ed. \$1.80; Trade ed. \$2.40.

This concise text is in the nature of an introduction to the philosophy of science. Although it is intended primarily for university students in philosophy, assuming "no special knowledge either of mathematics or of natural science," the author hopes that the book will also interest the general reader. In the brief introduction it is indicated that the student needs "an introductory guide to the types of argument and method scientists employ in actual practice." This need is supplied in the following chapters on discovery, laws of nature, theories and maps, and uniformity and determinism. There is also a list for suggested reading, and an index. This stimulating book is highly recommended.

PLANT BREEDING FOR EVERYONE, by John Y. Beaty. Chas. T. Brantford Co., Boston 16, Mass. 1954. pp. 102. Illus. \$2.75.

The twenty very brief chapters of this little practical manual were written by a layman for the layman. In the first part of the book, the selection, testing, naming and patenting of new varieties is presented. In the remaining chapters plant hybridization, bud selection and inheritance of characters are briefly considered.

DAYLILIES AND HOW TO GROW THEM, by Ben A. Davis. Tupper & Love. Atlanta, Ga. 1954. pp. 149. Illus. \$3.50.

This is a popular book on daylilies. The 22 brief chapters are concerned with hybridization, propagation, culture, and diseases of the daylily. In addition there are regional chapters by other writers.

THE CULTIVATION OF ANIMAL AND PLANT CELLS, by Philip R. White. Ronald Press, 15 E. 26th St., New York. 1954. pp. 239. Illus. \$6.00.

Written by an eminent authority primarily for the non-specialist, this handbook on the technique of cultivating plant and animal tissues and cells outside the body will be welcomed by investigators, teachers, students and the layman. The nine chapters are concerned with the cell versus the organism, the history of cell culture, the living material, the laboratory, nutrients, types of cultures, setting up cultures, growth measurements and their interpretations and applications. Some simple techniques for beginners, and a bibliography are presented in the Appendix. The names and subjects indices are adequate. This concise, easily readable handbook is highly recommended.

ASPECTS OF DEEP SEA BIOLOGY, by N. B. Marshall. Philosophical Library, 15 E. 40th St., New York. 1954. pp. 380. Illus. \$10.00.

According to the author, it is the purpose in this book to "utilize present knowledge on deep sea biology and my own unpublished work to build up, chapter by chapter, an integrated account of life in deep oceanic waters." The 13 chapters are devoted to the growth of deep sea biology, means of exploring the ocean, the deep sea environment, oceanic plants, animal life in the deep sea, deep sea food chains, vertical patterns and mid-water life, counteracting gravity, sense organs of deep sea fishes, deep sea sound, living light in the deep sea, life histories, and some aspects of marine biogeography. This excellent book is highly recommended.

PLANT LIFE IN MALAYA, by R. E. Holttum. Longmans, Green & Co., 55th 5th Av., New York. 1954. pp. 254. Illus. \$3.00.

The choice of plant material included in this popular book reflects the author's personal interests and emphasizes those plants of which he has special knowledge over a 30 year period. The subjects covered include trees, palms, pandans and tree ferns, bamboo, ginger and orchids, yams and other tubers, vegetative propagation, flowers and hybrids, fruits and seeds, bananas, grasses, the Pigeon Orchid, nest ferns and neighbors, terrestrial ferns, climbing plants, parasites and saprophytes, water plants, plants and ants, and the Malaya forest. This interesting pioneering book is highly recommended.

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.

I. THE AMERICAN AMARYLLIS SOCIETY

[Affiliated with the American Plant Life Society]

[AMERICAN AMARYLLIS SOCIETY, continued from page 2.]

(c) REGISTRATION OF PLANT NAMES

Registrars: Dr. J. B. S. Norton, and Prof. W. R. Ballard.

Correspondence about the registration of plant names should be sent directly to Dr. Norton, 4922 40th Place, Hyattsville, Maryland, and a self-addressed, stamped envelope should be enclosed if a reply is expected.

(d) AMARYLLID SECTIONS

GENERAL AMARYLLID SECTION

GENERAL AMARYLLID COMMITTEE—Mrs. Edith B. Stout, *Chairman*,
Kentfield, California

Maj. John W. Schaefer, *Wash.*

Miss Elaine Brackenridge, *Texas*

AMARYLLIS SECTION

AMARYLLIS COMMITTEE — DR. ROBT. G. THORNBURG, *Chairman*,
517 Professional Bldg., Long Beach 2, Calif.

Col. Russell S. Wolfe, *South Carolina*

Mr. Wyndham Hayward, *Florida*

Mr. Thomas R. Manley, *Vermont*

Mr. Armyrn Spies, *Illinois*

Dr. Hamilton P. Traub, *California*

Dr. J. C. Du Puis, *Florida*

FLOWER TYPES AND SCORE CARD FOR HYBRID AMARYLLIS

For classification of flower types of Hybrid Amaryllis see PLANT LIFE (HERBERTIA) 10: 23-30. 1954. For SCORE CARD see PLANT LIFE (HERBERTIA) 1950, pp. 45-46 (for "Elegans" read "Belladonna").

NARCISSUS SECTION

NARCISSUS COMMITTEE—Mr. Grant E. Mitsch, *Chairman*,
Daffodil Haven, Canby, Oregon

Mr. Jan de Graff, *Oregon*

Dr. Edgar Anderson, *Missouri*

Mr. Fred M. Danks, *Australia*

Mr. Arno H. Bowers, *Calif.*

Mr. Guy Wilson, *North Ireland*

Mr. Frank Reinelt, *California*

Mr. Kenyon L. Reynolds, *California*

Mr. Lionel Richardson, *North Ireland*

ALSTROEMERID SECTION

ALSTROEMERID COMMITTEE—Mr. H. L. Stinson, *Chairman*,
3723 S. 154th St., Seattle 88, Wash.

Mr. John F. Ruckman, *Pennsylvania*

Mr. W. M. James, *California*

Mr. Bruce Hinman, *Illinois*

Mr. Mulford B. Foster, *Florida*

ALLIEAE SECTION

ALLIEAE COMMITTEE—Mr. Bernard Harkness, *Chairman*,
Highland Park Herbarium, Rochester 20, N. Y.

Mr. F. Cleveland Morgan, *Quebec*
Mr. Claude A. Barr, *South Dakota*
Dr. Henry A. Jones, *Maryland*
Mr. Raymond B. Freeman, *Illinois*

Mr. F. L. Skinner, *Manitoba*
Mr. Elmer C. Purdy, *California*
W. R. Ballard, *Maryland*

PANC RATIEAE SECTION

PANC RATIEAE COMMITTEE—Mr. Len Woelffe, *Chairman*
6106 Ridge Ave., Cincinnati 13, Ohio.

Mr. Wyndham Hayward, *Vice-Chairman*, *Winter Park, Fla.*

Dr. W. S. Flory, *Virginia*
Mr. Thad M. Howard, *Texas*

Mrs. John Schmidhauser, *Virginia*
Dr. Hamilton P. Traub, *California*

HEMEROCALLIS SECTION

DAYLILY (HEMEROCALLIS) COMMITTEE—Mr. Elmer A. Claar, *Chairman*,
617 Thornwood Lane, Northfield, Ill.

Dr. Hamilton P. Traub, *Maryland*
Mr. R. W. Wheeler, *Florida*
Mr. W. Quinn Buck, *California*
Prof. W. R. Ballard, *Maryland*

Mr. Wyndham Hayward, *Florida*
Dr. Philip G. Corliss, *Arizona*
Dr. I. B. S. Norton, *Maryland*

[Members of the Hemerocallis Jury are *ex officio* members of the Daylily Committee.]

DAYLILY JURY (For evaluating Daylilies)—Dr. Robert E. Lee, *Chairman*,
Cornell University, Ithaca, N. Y.

Those in charge of Official Cooperating Trial Gardens are *ex officio* members of the Daylily Jury.

OFFICIAL COOPERATIVE DAYLILY TRIAL GARDENS

Prof. John V. Watkins, in charge of Daylily Trial Garden, College of Agriculture, University of Florida, Gainesville, Fla.

Dr. Robert E. Lee, in charge of Daylily Trial Garden, Dept. of Agriculture, Cornell University, Ithaca, N. Y.

Mr. Paul L. Sandahl, Supt., in charge of Daylily Trial Garden, Dept. of Parks and Public Property, City of Des Moines, Iowa.

Prof. H. T. Blackhurst, in charge of Daylily Trial Garden, Division of Horticulture, Texas Agric. Expt. Station, College Station, Texas.

Prof. Ira S. Nelson, in charge of Daylily Trial Garden, Dept. of Horticulture, Southwestern Louisiana Institute, Lafayette, La.

Mr. John E. Voight, RFD One, Box 76, Hales Corners, Wisc., in charge of Daylily Trial Garden, at The Botanical Gardens, Whitnall Park.

Mr. W. Quinn Buck, in charge of Daylily Trial Garden, Los Angeles Arboretum, 291 No. Old Ranch Road, Arcadia, Calif.

Note: Introducers of new daylily clones should send plants directly to the Trial gardens for testing. As soon as practical each trial garden will publish, in *HERBERTIA*, lists of the 10, 25, 50 and 100 best daylilies, on the basis of the clones tested, for the climatic region in which it is located.

II. OTHER COMMITTEES

GESNERIACEAE COMMITTEE—Dr. Kenneth H. Mosher, *Chairman*,
7215 Dayton Ave., Seattle 3, Washington

Mr. E. Frederick Smith, *California* Mr. Wyndham Hayward, *Florida*

ARACEAE COMMITTEE—Mr. Wyndham Hayward, *Chairman*,
Winter Park, Florida

Mr. Len Mirzwick, *California* Mr. Fred Danks, *Australia*
Dr. Hamilton P. Traub, *Maryland* Mr. Len Woelfle, *Ohio*
Mr. Leon W. Frost, *Florida* Mr. Alex D. Hawkes, *California*
Dr. Robt. G. Thornburgh, *California*

AGAVACEAE COMMITTEE—Mrs. Morris Clint, *Chairman*,
2005 Palm Boulevard, Brownsville, Texas

Mr. Wyndham Hayward, *Fla.* Dr. Hamilton P. Traub, *California*
Mr. Dick Felger, *California* Dr. Thomas W. Whitaker, *California*

SCHOOL GARDENS COMMITTEE—John F. Cooke, Jr., *Chairman*,
Em. 637, 1380 East 6th St., Cleveland 14, Ohio

Mrs. W. D. Morton, Jr., *Louisiana* Mr. Wyndham Hayward, *Florida*

III. PUBLICATIONS OF THE AMERICAN PLANT LIFE SOCIETY

B O O K S

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. \$4.00 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 (I—X; 1—90), including a portrait of George Yeld. \$1.50 postpaid.

P E R I O D I C A L S

(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 is the last opportunity for complete sets.

Volume 1 (1934). Dedicated to **Henry Nehrling**. Containing the biography of Henry Nehrling, and many valuable articles on amaryllis; with a portrait of Henry Nehrling and 16 other illustrations; a total of 101 pages.

Volume 2 (1935). Dedicated to **Theodore L. Mead**. Containing the autobiography of Theodore L. Mead, and many excellent articles on varieties, breeding, propagation, and culture of amaryllids; with portraits of Theodore L. Mead and David Griffith and 18 other illustrations; a total of 151 pages.

Volume 3 (1936). Dedicated to **Arthington Worsley**. Containing the autobiography of Arlington Worsley, and important articles on description, genetics and breeding, physiology of reproduction, and amaryllid culture; with 3 portraits of Arlington Worsley, one color plate, and 30 other illustrations; a total of 151 pages.

Volume 4 (1937). **First British Edition**. Dedicated to William Herbert. Containing the biography of William Herbert; the reprint of Herbert's essay, "On Crosses and Hybrid Intermixtures in Vegetables"; Dr. Darlington's essay, "The Early Hybridizers and the Origins of Genetics," and many important articles on description; cytology, genetics and breeding; physiology of reproduction, and amaryllid culture; with two portraits, forty-four other plates and three figures; a total of 280 pages.

Volume 5 (1938). First Netherlands Edition. Dedicated to Ernst H. Krelage. Containing the autobiography of Ernst H. Krelage; the history of amaryllid culture in Holland by Ernst H. Krelage, Dr. Uphof's important article in which the name *Hippeastrum* is rejected; a revision of the tribes of the Amaryllidaceae; and the species of *Amaryllis*; outstanding articles on forcing amaryllis by Dr. Grainger and Prof. Dr. van Slofteren; and many other articles on description, cytology, genetics and breeding; physiology of reproduction, and amaryllid culture; with 33 plates and 2 figures; a total of 218 pages.

Volume 6 (1939). Dedicated to the Union of **South Africa**, and containing articles on South African amaryllids, including the history of botanical exploration for amaryllids in South Africa, the distribution of South African amaryllids in relation to rainfall, and a review of the genus *Agapanthus* by Frances M. Leighton, a review of the Genus *Cyrtanthus*, with many excellent line drawings, by Dr. R. A. Dyer; other articles—*Zephyranthes* of the West Indies by Dr. Hume; the Tribe *Gilliesiaeae* by Dr. Hutchinson; rating of daylilies for garden value by Mr. Kelso; daffodil articles by Jan de Graaff, and many other items on description, cytology, breeding, propagation, and amaryllid culture; with 44 plates and 10 figures; a total of 258 pages.

Volume 7 (1940). Dedicated to **Latin America**, and featuring articles on Latin American amaryllids; biographies of Drs. Philippi and Holmberg; report by Dr. Goodspeed on the amaryllids collected by the Univ. of Calif., Second Andean Expedition; reports on the flowering of the "Blue *Amaryllis*," *A. procera*; and many other important articles on the description, propagation, breeding, culture, harvesting and storage of amaryllids. Of special interest are the important articles on the description, breeding and culture of daylilies by noted authorities. With 45 illustrations—30 plates and 15 figures—and a total of 242 pages.

Volume 8 (1941). First Daylily Edition. The first extensive symposium on the daylily, containing biographies of George Yeld, Amos Perry, Hans Sass, and Paul Cook, and important articles on daylily evaluation, breeding, propagation and culture. Also important articles on *Narcissus* and other amaryllids. Thirty-eight illustrations—27 plates and 11 figures—and a total of 185 pages.

Volume 9 (1942). First Alstroemerid Edition. Dedication to Harry L. Stinson, the outstanding authority on this plant group, who contributes a summary of his work on Alstroemerid taxonomy, breeding, propagation and culture. This volume contains the autobiography of Prof. Dr. Abilio Fernandes, the Check-List of Amaryllids by Major Pam, and a review of the species of *Crinum* by Dr. Uphof, and also many important articles on daylilies, *Narcissus*, *Cyrtanthus*, hybrid *Amaryllis*, *Ixiolirion* and other amaryllids. Thirty-five illustrations—17 plates and 18 figures—and a total of 243 pages.

Volume 10 (1943). 10th Anniversary Edition. Dedicated to Elizabeth Lawrence, the outstanding authority on the use of amaryllids in the garden, who contributes a summary of her work in this field. This volume contains the review of *Agapanthus* and *Tulbaghia*, by Dr. Uphof; and article on *Brunsvigia rosea* and hybrids by Mr. Hannibal; a symposium on *Narcissus* breeding by Messrs. Powell, Reinelt, Berry and Reynolds; a review of amaryllid chromosomes by Dr. Flory; articles on hybrid amaryllis, daylilies, and many other important articles on amaryllids. Forty-one illustrations—12 plates and 29 text figures—and a total of 205 pages.

Volume 11 (1944). First Allieae Edition. Dedicated to Dr. Henry A. Jones, the eminent American authority on the onion. This is one of the most outstanding issues up to the present for its record making contributions on the systematics of *Allium* by British authorities, and on onion breeding, propagation, and culture by American authorities. It contains Mr. Airy Shaw's translation of Vvedensky's *Allium* of the Soviet Union; Stern's essay on the onion in the Old World and other articles; and articles on onion breeding, propagation and culture by Dr. Jones and his colleagues. There are also important contributions on ornamental *Alliums* for North America, and Allieae of North America. There are excellent articles on hybrid *Amaryllis*, Daylilies and various other amaryllids. Forty-three illustrations—25 plates and 18 text figures—and a total of 369 pages.

Volume 12 (1945). First Educational Edition. Dedicated to Supt. R. C. Huey, a pioneer in the use of amaryllids as an educational tool. This volume contains a brief autobiography by Supt. Huey, and an article by him on the use of amaryllids in

teaching plant science; the announcement by Mulford B. Foster of the reintroduction of the sweet-scented *Alstroemeria caryophyllaea*, and an article by Harry L. Stinson on the true *Alstroemeria* Ligtu. This issue also contains an article on the origin of *Tapeinanthus humilis* by A. & R. Fernandes; important articles on Narcissus breeding; *Leucocoryne* and related genera; articles on various other amaryllids, including valuable contributions on *Hemerocallis* description and appreciation, breeding, culture, and packing daylily plants for shipping. Twenty-four illustrations—15 plates and 10 text figures—a total of 180 pages.

Volume 13 (1946). First Narcissus Edition. Dedicated to Guy L. Wilson, the noted Narcissus breeder. This volume contains an autobiography of Mr. Wilson, an article on his breeding activities; an article on Narcissus breeding in Australia by Mr. Alston; articles by American Narcissus breeders, including Frank Reinelt, E. P. Powell, J. S. Cooley, C. W. Culpepper and W. R. Ballard; an article on the karyology of the subgenus *Ajax* of the genus *Narcissus* by A. and R. Fernandes; a list of parents of hybrid *Narcissus* by Arno H. Bowers; *Narcissus* diseases by C. J. Gould; *Narcissus* insects and mites by E. P. Breakey; *Narcissus* culture by various authors. There are also articles on other amaryllids—*Hemerocallis*, hybrid *Amaryllis*, *Habranthus*, *Crinum*, *Lapagerias*, *Agapanthus*, *Hymenocallis*, etc. Thirty-nine illustrations—186 pages.

Volume 14 (1947). 2nd Hemerocallis Edition. Dedicated to Ralph W. Wheeler, the noted Daylily breeder. This volume contains an autobiography of Mr. Wheeler and an article on his breeding activities; and many important articles on *Hemerocallis* description, evaluation, breeding, etc., from various parts of the country. There are also important articles on other amaryllids—Hybrid *Amaryllis*, amaryllids in the Holy Land and Mexico, starch in *Alstroemeria*, the *Galantheae*, Double *Narcissus*, *Zephyranthes*, *Sternbergia*, *Allium*, etc. Twenty-eight illustrations—206 pages.

Volume 15 (1948). 2nd South African Edition. Dedicated to Dr. R. A. Dyer. This volume contains an autobiography of Dr. Dyer and two amaryllid articles by him, and other articles on South African amaryllids. There are also important articles on *Hemerocallis*, *Amaryllis*, *Crinum*, *Narcissus*, *Brodiaea* Lilies, *Alstroemerias* and other amaryllids by various authors. Forty-one illustrations—177 pages.

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Vol. 5 (Nos. 1—4) 1949. 34 illustrations, a total of 134 pages.

Gesneriaceae Edition, with important articles on the subject by F. E. Smith, W. Hayward and the Moshers.

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Vol. 6 (Nos. 1—4) 1950. 47 illustrations, a total of 162 pages.

1950 HERBERTIA Edition, devoted exclusively to the amaryllids; the Hybrid Amaryllis Edition; dedicated to Mrs. Mary G. Henry, containing Mrs. Henry's autobiography; articles on Collection Amaryllids in South America by M. B. Foster; Amaryllis flower types; double Amaryllis; Amaryllis of To-morrow, by W. Hayward, and other articles on hybrid Amaryllis, *Hemerocallis*, *Cyrtanthus*, Blue Amaryllis, South African Amaryllids, Review of the genus *Brunsvigia* (part I) by R. A. Dyer, etc.

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Vol. 7 (Nos. 1—4) 1951. 51 illustrations, a total of 174 pages.

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1952 HERBERTIA Edition, devoted exclusively to the amaryllids: the **Second Alstroemeria Edition**, dedicated to Dr. Uphof, containing an autobiography of Dr. Uphof, a review of the genus *Alstroemeria* by Dr. Uphof, the *Amaryllis Displays* at Cleveland, and New Orleans, the Orlando-Winter Park *Hemerocallis* show, *Amaryllis* evaluation by Thos. R. Manley, Dr. Thornburgh, C. E. Buck, E. Douglas, and Hermon Brown; articles on *Fragrant Alstroemeria* hybrids by M. B. Foster, advances in *Alstroemeria* culture by Harry L. Stinson, *Alstroemeria* articles by Prof. Bullock, Prof. Ballard, Mr. Ruckman, and E. O. Orpet. The issue also contains descriptions of a new *Amaryllis* species, and a new *Zephyranthes* species, and articles on *Zephyranthes* by Mrs. Clint, on *Lapiedra martinezii* by Dr. Fernandes, *Alliums* by B. Harkness, *amaryllid* garden material by W. L. Hunt and Thad Howard, *Narcissus* culture by Mr. Mitsch, *Crinum zeylanicum* by Mr. Hayward, *Hemerocallis* by Mr. Gilmer, and Mrs. Henry, *Hymenocallis* by Mr. Woelfle, *Amaryllid* color by Mr. Hannibal, and other important articles.

Malvaceae Edition, with articles on the Perfect Mallow Marvel by E. Sam Hemming, a new Hybrid Hibiscus, by Prof. Ballard, and propagation of Hibiscus, by Dr. Hava; and a report on plant culture activity in the Southwest Region by Dr. Corliss, the Plant Life Library (book reviews), the American Plant Life Society and Seeds and Plants Directory.

Vol. 9. (Nos. 1—4) 1953, with 32 illustrations, a total of 166 pages.

1953 HERBERTIA Edition, devoted exclusively to the amaryllids; sponsored by the **American Amaryllis Society**, which is affiliated with the **American Plant Life Society**. This is the **Second Narcissus Edition**, dedicated to E. A. Bowles, containing a portrait of Mr. Bowles, and papers on *Narcissus*: a review of 40 years devoted to *Narcissus* breeding by Guy L. Wilson, an article on miniatures, naturalizing, decorative, and a beginners' list by C. E. Quinn, fall-flowering *Narcissus* by L. S. Hannibal, *Narcissus* breeding by E. C. Powell, and W. R. Ballard, *Daffodils* in Piedmont, Virginia by H. I. Tuggle, old naturalized *Narcissus* in the South by Mrs. Evans, *Daffodils* in 1952 by Grant E. Mitsch, and *Daffodils* in northern California by H. I. Johnson.

There are also articles on other amaryllids, including reviews of *Amaryllis* Shows in New Orleans and Houston, papers on the evaluation of Hybrid *Amaryllis* by Mr. Manley and Dr. Thornburgh, an article on *Allium* by R. B. Freeman, *Amaryllis* species by Mrs. Mary G. Henry, the Orpets, and Mr. Burlingham, *Hemerocallis* by S. E. Saxton, George Gilmer, and W. R. Ballard, *Calostemma* by Mr. Chandler, *Crinum scabrum* by Thad M. Howard, *Lycoris* by Wyndham Hayward, *Hymenocallis* by Len Woelfle, and on other amaryllid subjects, including the description of two new *Amaryllis* species.

Agavaceae Edition, with articles on *Dracaena* and *Cordyline* by Mrs. Morris Clint, The Tribes and Genera of the *Agavaceae*, and *Polyanthes tuberosa* by Hamilton P. Traub, *Beaucarnea recurvata* by Mulford B. Foster, and sections on The Plant Life Library (book reviews), the American Plant Life Society, a complete list of publications, and Seeds and Plants Directory.

Vol. 10. (Nos. 1—4) 1954, with 23 illustrations, a total of 143 pages.

1954 HERBERTIA EDITION, devoted exclusively to the Amaryllids; sponsored by the American Amaryllis Society, which is affiliated with the American Plant Life Society. This is the **Second Amaryllis Edition**, dedicated to Thomas R. Manley, M. S., and contains an autobiography of Mr. Manley and three valuable articles by Mr. Manley on the evaluation, forcing culture and merchandising of *Amaryllis*; articles on the Divisions of cultivated *Amaryllis* by H. P. Traub, evaluation of *Amaryllis* by Dr. Thornburgh, the McCulloch hybrid *Amaryllis* by Edith B. Strout and Polly Anderson, *Amaryllis* and other amaryllid culture by Armyn Spies, Mrs. W. D. Morton, Wyndham Hayward, Mrs. Jo. N. Evans, and Dr. Philip G. Corliss; *Amaryllis* insects and mites by Dr. Floyd F. Smith and C. L. Burlingham; *Amaryllis* propagation by

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Other articles include—the rediscovery of *Zephyranthes concolor* by Mrs. Clint; flowering habit of *Ammocharis* by Mr. Hannibal; cytology of *Tulbaghia violacea* by Drs. Whitaker and Flory; inheritance of seed color characters in *Brunsvigia* by Mr. Hannibal; hybridization in *Hymenocallis* by Mr. Woelfle; *Haemanthus*, by Mr. Spies; *Lycoris* by Mr. Saylor; *Nerines* by Mr. Hayward; *Amaryllis* in the Cleveland Public School program, by Mr. Cooke, Jr.; and other interesting articles.

The **General Edition**, contains articles on vacation trips by W. M. James; the Saratoga Horticultural Foundation, by Mr. James; rack for exhibiting flowers by Dr. Corliss; the genus *Ipheion*, by Drs. Traub & Moldenke; Rose Breeding, Dwarf Thyme; dwarfing fruit trees; and an Outline for the Gardening Program in the Cleveland Public Schools, by Paul R. Young; the Plant Life Library (book reviews); the American Plant Life Society; and a complete list of publications.

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FIELD CROP PRODUCTION, by H. K. Wilson and W. M. Myers. J. B. Lippincott Co., 227 So. 6th St., Philadelphia, Penna. 1954. pp. 674. Illus.

In this new book, which is designed primarily for use as a text, the objective of the author has been to organize "in readily accessible form the latest known facts in principles and practices of field crop production." No attempt has been made "to prepare an exhaustive reference work. Instead an effort has been made to present the basic principles and practices of field crop production with only a minimum of detailed documentation." The first six chapters are concerned with the history of agronomy; plants, and plant growth; climate and soils in relation to plant growth; crop sequence and maintenance of soil fertility; and tillage. The remaining chapters are concerned with the various field crops; weeds; crop improvement by plant breeding; and producing quality seeds. This concise, easily readable text is highly recommended.

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1955

EDITED BY

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[i]

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