

# PLANT LIFE

**AMARYLLIS**  
YEAR BOOK

1982



Pure White Double Hybrid  
Amaryllis Clone 'White Nymph' (1981)  
Produced by Walter and Hilda Latapie  
of New Orleans, Louisiana

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## TABLE OF CONTENTS

The cover design by Prof. Penrith Goff, pictures the first pure white double *Amaryllis* hybrid clone, 'White Nymph' (1981), produced by Walter and Hilda Latapie of New Orleans, Louisiana.

### PLANT LIFE, VOLUME 38, NO. 1, 1982 — AMARYLLIS YEAR BOOK (NO. 49) GENERAL AMARYLLID EDITION

The American Plant Life Society .....	6
Preface .....	7
Dedication .....	9
Walter Ralph Latapie, an autobiography .....	11
Mary (Hilda) Siemssen Latapie, an autobiography .....	12
Breeding Hybrid <i>Amaryllis</i> — A rewarding experience, by Walter and Hilda Latapie .....	15
Confusion and Discord Caused by Unnecessary Conservation of Genera, by Hamilton P. Traub .....	18
Amaryllidaceae in the Peoples' Republic of China, by Wm. T. Drysdale .....	19
In Memoriam — Floor Barnhoorn, 1911-1980 .....	19
In Memoriam — Mrs. Garnett Barnes Forbert, 1899-1977 .....	20
In Memoriam — Salome (Sally) Fox, 1912-1980 .....	20
Editor's Mail Bag .....	21
<b>1. REGIONAL ACTIVITY AND EXHIBITIONS</b>	
The 1981 Amaryllis Show Season .....	22
1981 Greater New Orleans All-Horticulture Amaryllis Show, by L.W. Mazzeno .....	22
Houston Amaryllis Society Official Show, 1981, by Mrs. A. C. Pickard .....	23
1981 New Orleans Intra-Club Amaryllis Show, by L. W. Mazzeno .....	24
1981 Corpus Christi (Texas) Amaryllis Show, by Mrs. Carl Henny .....	25
1981 Amaryllis Society of Alabama Show, by Fred D. Frambrough, Jr. ....	26
1981 Southern California Hemerocallis & Amaryllis Society Show, by Kenneth Mann .....	27
Western Australia Amaryllis Show, 1981, by Mrs. J. Tondut .....	29
<b>2. LINEAGICS</b>	
Chromosome Counts for Six Amaryllis Taxa, by Margot Williams .....	34
Chromosomes of a Dwarf <i>Crinum</i> from the West Indies, by W. S. Flory .....	31
Habitat of <i>Amaryllis vittata</i> in Peru, by J. L. Doran .....	39
Seeds of <i>Amaryllis</i> species and <i>Worsleya rayneri</i> , by J. L. Doran .....	40
<i>Hymenocallis maximilianii</i> sp. nov., by T. M. Howard .....	41
Contributions to South American <i>Amaryllidaceae</i> , by Pierfelice Ravenna ..	42
<i>Alstroemeria</i> x <i>Zebrina</i> Duncan, hybr. nov. ....	56
Registration of New Amaryllid clones, by James M. Weinstock .....	57
<b>3. GENETICS AND BREEDING</b>	
A Tetraploid <i>Amaryllis starkii</i> , by Margot Williams .....	59
The Continuing Pursuit of Yellow, by C. D. Cothran .....	61
<i>Amaryllis</i> Breeding in Australia, by Warren J. Glover .....	63
Double <i>Amaryllis</i> — Summer 1981, by John Wade Deme .....	65
Pollen Storage, by Marcia C. Wilson .....	67
Developing a Homozygous Pure Breeding <i>Amaryllis</i> Pool, by Ivan J. Kenny .....	68
<i>Amaryllis</i> Hybrids, by Prakash Narin .....	72
Advances in <i>Crinum</i> Breeding (Part II), by T. M. Howard .....	78

4. AMARYLLID CULTURE

Promoting More Bloom on *Amaryllis*, by J. L. Doran ..... 87  
 General Amaryllid Committee Report — 1982, by Randell K. Bennett ..... 88  
 1982 Zephyrantheae Committee Report, by Marcia C. Wilson ..... 90  
**Brunsvigia** and **Nerine** Committee Report — 1982, by William R. P. Welch . 92  
*Amaryllis aurica* naturalized in California, by Thomas W. Whitaker ..... 95  
 North Midland Committee Report — 1982, by Russell H. Manning ..... 97  
 The Birth of an *Amaryllis* Enthusiast, by Richard L. Beaudoin ..... 106  
 Dwarf West Indies *Crinum* sp., under Swamp Nutrient Solution Culture, by  
 Hamilton P. Traub ..... 109

PLANT LIFE, VOLUME 38, NOS. 2—4, INCL., 1982  
 GENERAL PLANT EDITION

1981 Mexican Plant Exploration Trip, by T. M. Howard ..... 112  
 Order **Alliales**, by Hamilton P. Traub ..... 119  
 The Sunflower as the U. S. National Flower ..... 117  
 The Market Place ..... 109  
 Plant Life Library ..... 133  
 The American Plant Life Society (continued) ..... 135  
 The American *Amaryllis* Society ..... 135  
 Publications ..... 137  
*Crinum* and *Zephyranthes* Clones, by Marica Wilson ..... 110  
*Zephyranthes Briquetii*, by Pierfelice Ravenna ..... 116

ILLUSTRATIONS

Frontispiece portraits — Herbert Medalists, Walter and Hilda Latapie ..... 10  
 Fig. 2. 'White Nymph' (1981), pure white, fragrant double hybrid **Amaryllis** . 14  
 Fig. 3. 'Hilda Latapie' (1969) fragrant, near white double hybrid **Amaryllis** .. 16  
 Fig. 4. 'Michele Latapie' near white double hybrid **Amaryllis** ..... 17  
 Fig. 5. Mrs. E. O. Greiner, winner, Gold Rosettes and Silver Trophy, Houston  
*Amaryllis* Show, 1981 ..... 23  
 Fig. 6. Winners at 1981 Intra-Club Show, Mens' *Amaryllis* Club, New  
 Orleans ..... 25  
 Fig. 6a. Exhibits at So. Calif. *Amaryllis* Show, 1981 ..... 28  
 Fig. 7. Chromosomes of Dwarf West Indies *Crinum* sp. .... 32  
 Fig. 8A-13B, inclusive, Chromosome drawings and karyotypes of 6 **Amaryllis**  
 species ..... 36-38  
 Fig. 14. Seeds of 14 **Amaryllis** species, and **Worsleya rayneri** ..... 40  
 Fig. 15. *Crinum salsum* sp. nov. Ravenna ..... 43  
 Fig. 16. *Urceolina microcrater* Kraenzl ..... 52  
 Fig. 17. *Alstroemeria x zebrina* Duncan, hybr. nov. .... 56  
 Fig. 18. **Amaryllis starkii**; colchicine-induced tetraploid ..... 60  
 Fig. 19. Deme, Light orange pink double hybrid **Amaryllis** ..... 66  
 Fig. 20. Narin, Hybrid **Amaryllis** clone, 'Gorgeous' ..... 74  
 Fig. 21. Narin, Hybrid **Amaryllis** clone, 'Charm' ..... 74  
 Fig. 22. Narin, Hybrid **Amaryllis** clone, 'Apollo' ..... 76  
 Fig. 23. Narin, Hybrid **Amaryllis** clone, 'Diana' ..... 76  
 Fig. 24. Narin, Hybrid **Amaryllis** clone, 'Sydney Percy Lancaster' ..... 77  
 Fig. 25. Howard, Hybrid *Crinum* clone, 'William Herbert' ..... 80  
 Fig. 26. Dr. Whitaker, **Amaryllis aurica** Ker-Gawl., naturalized ..... 96  
 Fig. 27. Dwarf West Indies *Crinum* sp. under nutrient culture ..... 108  
 Fig. 28. Wilson, Hybrid *Zephyranthes* clone, 'Capricorn' ..... 110  
 Fig. 29. The Desert Glory Lily, *Hesperocallis undulata* Asa Gray ..... 118  
 Fig. 30. The Himalayan Onion Lily, *Milula spicata* Prain ..... 128

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**AMARYLLIS**  
**YEAR BOOK**  
**1982**

Year Book of  
The American Amaryllis Society  
50th Issue

GENERAL AMARYLLID EDITION

EDITOR

HAMILTON P. TRAUB

ASSOCIATE EDITORS

R. MITCHEL BEAUCHAMP

HAROLD N. MOLDENKE

THE AMERICAN PLANT LIFE SOCIETY

Box 150, La Jolla, California 92038

## THE AMERICAN PLANT LIFE SOCIETY

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

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*Box 150, La Jolla, Calif. 92038*

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(AMERICAN AMARYLLIS SOCIETY, continued on page 135.)

## PREFACE

In the 1981 PLANT LIFE, W. J. Tjaden pointed out that the cause of the unnecessary and time wasting controversy about the identity of the name, *Amaryllis belladonna* L.(1753), as representing the *American Belladonna*, was due to the introduction of circumstantial evidence (suppositions), and thus without substance.

The members will be happy to learn that further progress has been made during 1981 with the realization that the confusion and discord in the minds of some has been due to a lack of understanding of the *International Code of Botanical Nomenclature*, which regulates the application of plant names.

Unfortunately, *Hippeastrum* Herb. (1821) was conserved against *Leopoldia* Herb. (1821), on the initiative of Sealy (1950), and listed in the *Code* appendix of conserved names. Although this action is *pointless* and has no meaning since *both genera* are synonyms of the prior valid name *Amaryllis* L. (1753), *some persons* believed that *Hippeastrum* (1821) had been conserved against *Amaryllis* L. (1753), which is not true. Thus the mischief was *much ado about nothing*. This realization represents real progress and points to the end of the *unnecessary* controversy.

The *Herbert Medal* for 1982 has been awarded to Walter and Hilda Latapie of New Orleans, Louisiana, who over a quarter of a century, pursued the goal for a *double white* hybrid *Amaryllis* clone, which was reached in 1980 with 'White Nymph'. The first pure white single hybrid *Amaryllis*, 'Snowdon' was reported in Europe in 1904.

The Latapies contribute autobiographies and an interesting article on "Breeding Hybrid *Amaryllis* - A rewarding Experience" in this issue of PLANT LIFE.

Mr. Drysdale reports on the *Amaryllidaceae* in the Peoples' Republic of China; Margot Williams describes the chromosomes of six *Amaryllis* species; J. L. Doran reports on the discovery of the native habitat of *Amaryllis vittata* in Peru, and pictures the seeds of 14 *Amaryllis* species, and *Worsleya rayneri*; Dr. Howard describes the new species, *Hymenocallis maximilianii* from Mexico; Prof. Ravenna contributes his usual informative article on South American *Amaryllidaceae*, the 9th in the series; Mr. Weinstock lists registrations of *Amaryllis*, *Crinum* and *Zephyranthes* clones; Mr. Duncan describes the new *Alstroemeria* hybrid, *A. x zebrina*; Margot Williams reports on the colchicine-induced tetraploid, *Amaryllis starkii*; Mr. Glover reports on *Amaryllis* breeding in Australia.

Mr. Cothran writes about continued progress in his quest for yellow and other types of hybrid *Amaryllis*; Mr. Deme reports on further progress in his double *Amaryllis* breeding project.

Marica Wilson informs the members on methods of pollen storage; Mr. Kenny invites interested members to join him in developing a homogeneous pure breeding *Amaryllis* pool; Mr. Narain reports on *Amaryllis* breeding in India.



Dr. Howard concludes his report on hybrid *Crinum* breeding; and J. D. Doran writes on promoting more bloom on *Amaryllis*; Mr. Bennett presents his Annual General Amaryllid Report; Marcia Wilson presents the annual *Zephyrantheae* Report; Mr. Welch offers the first *Brunsvigia* and *Nerine* Report; and Mr. Manning the usual interesting annual North Midland Committee Report; Dr. Howard favors us with his report on the 1981 Mexican Plant Exploration trip, and Dr. Flory informs us about the chromosomes of a dwarf West Indies *Crinum*.

*There are reports on the regional Amaryllis exhibitions and other articles as shown in the Table of Contents.*

It is of interest to note two approaching Golden Anniversaries:

(1) The 50th anniversary (in 1983) of the founding of *The American Amaryllis Society* in 1933 at Orlando, Florida, by Wyndham Hayward, Justice E. G. Duckworth, R. W. Wheeler, and Hamilton P. Traub, with an array of 76 additional international *charter members* from the United States - Florida, California, Virginia, New York, Pennsylvania, Massachusetts, District of Columbia, Kentucky, Louisiana, Rhode Island, Delaware, Tennessee, Washington, Texas, New Jersey, Nebraska, Minnesota, Georgia, Missouri, Mississippi, Colorado and Hawaii - and from Japan, Netherlands, England and North Wales (Great Britain) and Kenya, East Africa.

(2) The 50th Anniversary (in 1984) of the publication of *The Amaryllis Year Book*, devoted to the advancement of the *Amaryllidaceae* in 1934.

Although apparently Thomas W. Whitaker and Hamilton P. Traub are the only surviving Charter Members, other early Members and Members generally, are requested to contribute their impressions about the Society and its influence in bringing about a *Golden Age of Amaryllid Appreciation*.

Contributors to the 1983 issue of PLANT LIFE are requested to send in their articles by August 1, 1982, in order to insure earlier publication of this edition. Unless articles are received on time, publication will again be delayed to June or July or even later as with some issues in the past. Your cooperation toward earlier publication will be greatly appreciated. *Those having color slides or transparencies which they wish to use as the basis of illustrations are requested to have black-white prints made, and to submit these with their articles.*

May 1, 1982,  
2678 Prestwick Court,  
La Jolla, California 92037

Hamilton P. Traub

DEDICATED TO  
WALTER AND HILDA LATAPIE



WALTER AND HILDA LATAPIE-WILLIAM HERBERT MEDALISTS

## WALTER RALPH LATAPIE

## AN AUTOBIOGRAPHY

I was born on August 28, 1909 in New Orleans, Louisiana, the son of Dominick A. and Katherine Wagner Latapie. My father was a butcher and owner of several stalls in the French Market in New Orleans. He died when I was eleven. I was educated in the public schools of New Orleans. My education was supplemented with a special course from the International Accountants Society. At the age of 14 years I was employed by the Orleans Parish School Board as their Messenger, and after 13 years and holding various positions within the organization I was named their Chief Accountant, a position I held for the next thirty-two years until my retirement in 1968. I am, I believe, the first public official in New Orleans to have inaugurated the program of investing idle funds, having started it in the year of 1936.

During my tenure as a School Business Official, in 1952 I was instrumental in the founding of the Southeastern Association of School Business Officials and served as its secondary secretary and its fifth president, and in later years was asked and served for ten years as its Executive Secretary.

On January 17, 1935 I married Mary Hilda Siemssen and we were blessed with three children, Walter Ralph Jr., Lynn Marie and Alan John. We are still living in the home we built the year after our marriage. When we moved in we were given our first *Amaryllis* bulbs by an aunt who had been raising them for years. They were of the Mead strain and a very beautiful deep red trumpet-type, of which we still have a few after forty-four years. We were immediately bitten by the "Amaryllis bug." After they bloomed in our yard we wanted more of them. We obtained some different pollen and crossed on our red and planted the seeds. Being new at growing them, it seemed to take so long for us to obtain blooms. We entered one in our first show, and, to our surprise, won our first blue ribbon and an Award of Merit together with a Five-dollar prize. This all happened at the Garden Circle Amaryllis Show on March 22, 1952. It was here we came in contact with the late Mrs. La Forest Morton, a friendship which lasted until her death in 1955. With the Five-dollar prize we purchased our first Ludwig bulb, 'Nivalis.' From this show we went on and have over the years won top prizes in at least five major shows, including the Spring Fiesta in New Orleans. Our trophies include many gold cups, silver cups, and trays, along with tri-color, blue, red and yellow ribbons.

In 1957, several men and myself, whose wives were members of the Garden Circle Amaryllis Club, got together and formed the Men's Amaryllis Club of New Orleans. I became its fifth President and have served as Show Chairman and helped put on the 21 shows throughout the 23 years of its existence.

In the later years we purchased our first McCann doubles from Florida and also imported some miniature doubles from India, which were of various color combinations but not pure white. Since we had not seen any solid white doubles we thought it would be a challenge to try for one. At first we obtained near-whites by crossing double pollen on Dutch white bulbs. One of the better ones was the 'Hilda Latapie' (Plant Life 1966 page 71.) We continued crossing back on the best near-white, until we eliminated the small amount of red from the doubles used, and have produced some outstanding solid white doubles, triples and semi-doubles. As we plant a limited number of seeds each year, in the Spring we look forward to the results of our "crossing" and are continuing the work with pure white doubles. We are also working with orange, rose and salmon, crossing with pollen from the doubles, trying for good doubles in these colors. However, we do not have enough space for propagating the new seedlings by cuttage, as our garden area is our yard, surrounding our home, on a lot approximately 50 ft. x 120 ft.

After the registration of our first double we were contacted by a prominent Dutch grower of Holland who expressed an interest in obtaining some of our doubles. We sent some to him and in 1975 and 1978 we visited his Nurseries and took additional bulbs with us for them. While there in 1978 we were pleased to see some of our bulbs in bloom in one of their (glass) greenhouses.

## MARY "HILDA" SIEMSSSEN LATAPIE

### AN AUTOBIOGRAPHY

I was born on January 9, 1912, in Mobile, Alabama, the daughter of John Frederick Siemssen and Florence Irene Zengel. When I was twelve years old we moved to New Orleans, Louisiana. In Mobile I attended a Catholic School and then attended public schools in New Orleans. After high school I completed a secretarial course at Spencer Business College and entered the business world as a Secretary in an export company, until my marriage in January, 1935, to Walter Ralph Latapie, when I retired to become a home-maker and mother. We were blessed with three children, Walter Ralph, Jr., Lynn Marie, and Alan John. In addition to my duties as a mother to three children, all of my spare time was devoted to gardening. As the children grew older, I had more time for myself and joined the Garden Circle Amaryllis Club in the '50's, where I was an active member and helped stage the annual amaryllis shows.

When my husband, Walter, retired from the Orleans Parish School Board he continued his work with the Southeastern Association of School Business Officials as Executive Secretary, I became his secretary and assisted him with the work and running the annual meetings, and in 1972 was named Honorary Member, becoming the first non-school person to achieve this honor.



My husband and I are strictly amateurs in the gardening field, but from the very beginning we were never satisfied with just growing the plants and bulbs that were recommended for our area. We tried tulips and hyacinths, by refrigerating the bulbs, and had them bloom, when other gardeners passed them by. There were many times when we were not successful with trying something different, but we continued our efforts. Our *Strelitzia reginae* is about 7 ft. tall and the two original plants fill a space about 5 feet by 10 feet. They were planted years ago, when others were afraid to try them. Other favorites of ours, seldom seen in New Orleans gardens are the Yellow Ginger (*Hedychium gardnerianum*) and *Curcuma zedoaria*. Also, we tried growing White and Blue *Agapanthus* many years ago, some from seed. *Haemanthus multiflorus* is another favorite which is seldom seen growing outdoors in our city, but we have had good results with them. We also like the easy-to-grow daylily hybrids and have quite a collection of cannas. Our great "love" is *Amaryllis*, and we're continuing with hybridizing the doubles. While we do not know how much longer we will be physically able to work with them, we hope to "keep going" as long as we can.

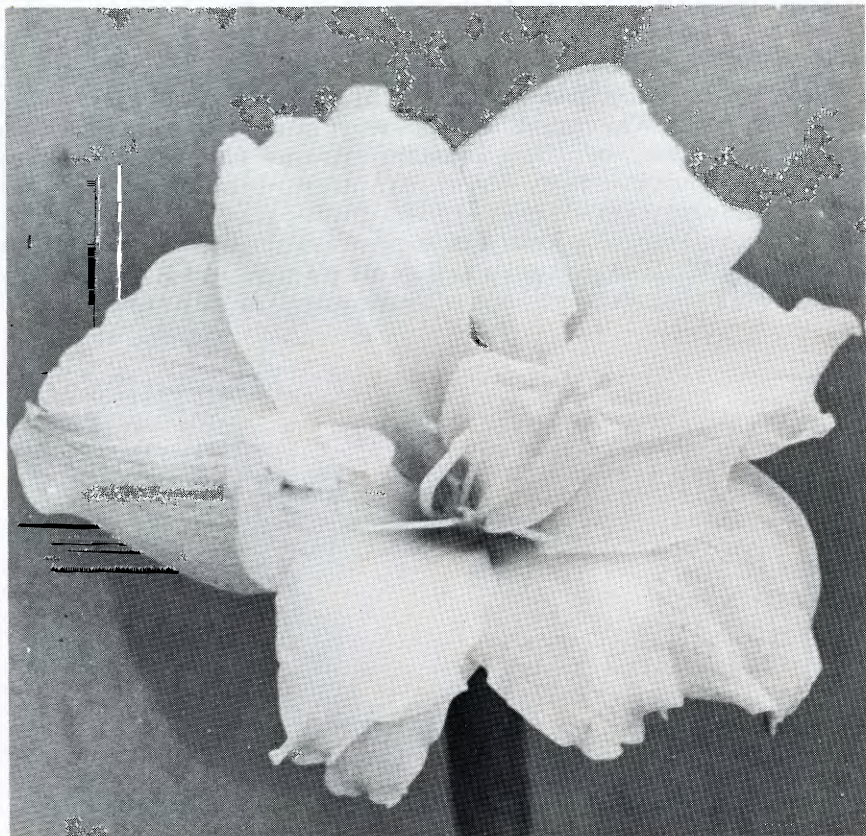


Fig. 2. 'White Nymph' (1980), the first named pure white double **hybrid Amaryllis** clone; produced by Walter and Hilda Latapie of New Orleans, Louisiana. 'Lynn Latapie', not pictured, is another white, green throat; fragrant; umbel 3-flowered.

## BREEDING HYBRID AMARLYLLIS— A REWARDING EXPERIENCE

WALTER AND HILDA LATAPIE

After winning our first blue ribbon with our seedling and obtaining our first "Dutch" *Amaryllis* we really got into the "Dutch" strain and began to build up our collection with the various shades offered, mostly by Ludwig & Co. However, with no greenhouse and with some severe winters in New Orleans, when we had to bring these potted plants into our home to carry them over 'til Spring, we began to wonder if we could cross these large and lovely imported *Amaryllis* with the more hardy Mead strain (known locally and in the *Amaryllis* shows at that time as "American" hybrids), which we grew outside in the ground all year, having only to cover them when a hard freeze threatened. With this in mind, we started making crosses.

In the various flower shows held in New Orleans, *Amaryllis* were divided into two classes, (1) American and (2) Dutch. In the "American" classes there were no pure white amaryllis. So we worked toward producing solid white that would be hardy, by crossing the near-white garden-variety with the Dutch white. This took many years, but after a few crosses, back and forth, some very hardy pure white were obtained. We also crossed hardy "American" hybrids with the "Dutch" and produced hybrids in the different shades and size of the "Dutch" but much hardier. They stay in the ground all year, and multiply.

Then, came our next project, to produce a pure white doubles, which is another story.

Continuing where the late Capt. J. J. McCann left off (Plant Life 1937) we accepted his challenge and after our success with crossing the pastel colors of the Dutch *Amaryllis* with the Mead strain to secure the hardy hybrids, we now decided that the time was ripe to do something with doubles, and in 1969 were successful,—one special one was solid red and another was a white with a faint red stripe (see Plant Life 1970). These were the first of the Latapie doubles and were named and registered. The red one was named 'Walter Latapie' (A877) and the near-white 'Hilda Latapie' (A876). As was the experience of Capt. McCann, the red one was a prolific producer having as many as 6 or 7 offsets in a six-inch pot. However, the near-white did not respond as well. We continued in our work, by re-crossing the near-white one with the 'Marie Goretti' and other Dutch whites and produced pure white, one of the best of which we have identified for our own purposes as "D-100." In later years we used the "double pollen" on regular white seedlings from previous batches of seedlings. Not all of the seedlings from a double by a regular cross will be double,—some may have the usual 6 segs, or as many as 20. That is what makes hybridizing doubles so interesting, we never know if the perfect double or triple will show up in the Spring when seedlings bloom for the first time.



In 1969, as a result of the article which appeared in *Plant Life 1966*, a Holland grower wrote and offered to buy some of the bulbs. Since our supply was small and our growing space limited, we were not in a position to



Fig. 3. 'Hilda Latapie' (1969), a beautiful near white double *Amaryllis* clone produced by Walter and Hilda Latapie of New Orleans, Louisiana. (White with faint cherry red streak on the side of each tepal midrib; inner throat green; fragrant.)

multiply many of them. We offered to send the 'Hilda Latapie' bulb to them to be propagated under that name, which was agreed to. Since then, in

1975, we visited his greenhouses and also brought some additional bulbs to him. Again, in 1977 we shipped several additional doubles, and in 1978 we re-visited his place and were rewarded by seeing some of our doubles in bloom (which had been shipped to him in 1977). We were advised that they had successfully used our pollen on some of their bulbs.



Fig. 4. 'Michele Latapie' (1982), a beautiful near white double *Amaryllis* clone-produced by Walter and Hilda Latapie of New Orleans, Louisiana. (White with red stripes, inner throat green; slightly fragrant.)

Although we are continuing our work with the white doubles, we're also making crosses by using pollen from the solid white doubles on other *Amaryllis* in pastel shades, trying for something different. During the 1979 blooming season we noticed many different color combinations, ranging from pure white to solid rose, salmon, and white and red striped ones.

In our area we recommend doubles for the outdoor garden. They usually multiply, and the blooms last longer than those of single *Amaryllis*. Having a greater number of segs, close together, they can withstand our



strong winds and showers in the Spring. In late Fall the beds are mulched with oak leaves. If a severe freeze is predicted we add more leaves if all of the bulbs are not covered. Although our seedlings grow in the ground outdoors (after the first year in flats), when we discover an outstanding seedling blooming for the first time we usually mark it and pot it. We don't want to take a chance on losing it after waiting years for it to bloom. This past season we were well pleased with the doubles and semi-doubles blooming for the first time. Growing *Amaryllis* from seed is a most rewarding experience, especially when working with doubles.

### CONFUSION AND DISCORD CAUSED BY UNNECESSARY CONSERVATION OF GENERA

The unnecessary and confusing conservation (Sealy, 1950) of the Genus *Hippaestrum* Herb. (1821) against the Genus *Leopoldia* Herb. (1821) was carried out, although both genera are synonyms of the valid Genus *Amaryllis* L. (1754), and thus inoperative.

In addition this unnecessary action has caused discord and misunderstanding among those who are not informed about the validity of plant names under the *Code*.

Had the *Code* injunction, "Designation of lectotypes should be undertaken only in light of an understanding of the groups concerned" been strictly observed, all the confusion and discord could have been avoided.

Fortunately, where the *Code* violation failed to provide protection, most of the valid literature on the *Amaryllidaceae* since the late 1930's has been published in strict accord with the *Code* in the international journals, HERBERTIA, THE YEAR BOOK OF THE AMERICAN AMARYLLIS SOCIETY, devoted to the *Amaryllidaceae*, 1938-1948; and continued as a section in PLANT LIFE, from 1949 to the present time, a period of 44 years. Thus, few inaccuracies, due to lack of *Code* observance, have crept into the literature, due to the misunderstanding caused by the *unnecessary* conservation of *Hippaestrum* against *Leopoldia*.

It stands to reason that in the case of such an *unnecessary and confusing* entry, it should be speedily eliminated from the *Code* Appendix for conserved names, in order to avoid further confusion among those who are not specialists in the application of the *Code* provisions (see McVaugh, Ross and Stafleu, 1968.)

#### REFERENCES

Sealy, J. R. (1950). Prop. 3, p. 277, Sym. Stockh. (Unnecessary conservation of **Hippaestrum** vs. **Leopoldia**).

McVaugh, Rogers, Robert Rose and Frans A. Stafleu (1968). **Regnum Vegetabile** Vol. 56: pp. 10-11. (Present policy of including **unnecessarily conserved** generic names on the list of conserved names in the **Code Guide** should be changed to avoid confusing the uninformed public.)

A comprehensive article on **The Lectotypification of *Amaryllis belladonna* L. (1753)**, as the American Belladonna has been approved for publication, in **Taxon**, journal of the **International Association for Plant Taxonomy**. This article will be reprinted in PLANT LIFE for the information of the members of **The American Amaryllis Society**.

## AMARYLLIDACEAE IN THE PEOPLES' REPUBLIC OF CHINA

WILLIAM T. DRYSDALE  
4300 Isabella  
Riverside, CA 92501

On a three weeks' tour of China I saw several species of the Amaryllidaceae. It was quite a surprise to see *Clivia cyrtanthiflora* blooming in the lobby of the Peking Hotel which is adjacent to Tien An Min Square. It was also seen at the Peking Arts and Crafts Commune. There were two cut stems of *Clivia miniata* in a souvenir store at the Summer Palace. Of course, these would have to be pot grown so far north. In the Mao Tse-Tung Memorial Hall I was amazed to find rows of potted artificial plants of *Clivia cyrtanthiflora* - very well done but with somewhat glorified inflorescences at the base of the crystal sarcophagus. Since the live plant was flowering at the hotel, possibly the flowers are seasonally changed.

In Peking and also in Chungking, 1500 miles up the Yangtze from Shanghai, I saw pots of *Amaryllis*. These were poor forms found in California gardens forty years ago and even then considered inferior, having narrow off-white petals with red stripes. At Nanking at the airport there were good forms, but not approaching the Dutch Hybrids. At Guilin (Kweilin) there was a spectacular clump of what appeared to be a form of *A. gracilis*. It was a glorious sight in a rock pocket at the base of one of the pinnacle peaks that are the wonder of Kweilin.

It was at Chungking that a number of specimen *Crinum* plants, apparently of the same species, were found. The location is in south China, one of the five furnace cities of China. It is known as "furnace of the Yangtze". April was a bit early for them to flower. They did not appear to be *C. asiaticum*.

## IN MEMORIAM — FLOOR BARNHOORN — 1911-1980

The members will be saddened to hear that *Herbert Medalist* for 1976 and Managing Director of Harry Deleeuw Company of SOUTH AFRICA, who was devoted to the production of the HADECO large-flowering hybrid strain of *Amaryllis*, marketed world-wide, died on April 23, 1980. The 1976

PLANT LIFE issue was dedicated to him. He will be long remembered for his sterling qualities.

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### IN MEMORIAM — MRS. GARNETT BARNES FORBERT 1899-1977

Popularly known as Mrs. Sam Forbert, Mrs. Garnett Barnes Forbert was born in Laurel, Mississippi on August 30, 1889 and died at Hattiesburg in the same State on November 9, 1977.

Mrs. Forbert organized *The Hattiesburg Amaryllis Society* on April 17, 1958, and presided as President of that Society at two different times, 1958-1960, and 1966-1968.

She was a dedicated breeder and grower of herbs and Amaryllids, including *Zephyranthes atamasco* and *Amaryllis*.

She was an active member of various civic clubs and other organizations, and gave freely of her talents, of which she had many. She was not only an *Amaryllis* judge, but was also an accredited flower show judge, and was happiest when sharing her talents with anyone in need. She was in fact unselfish in her sharing, always willing to go "the second mile". She will be missed not only by her Club friends, but also by her Church, her neighbors, and the entire community in which she lived. — *Sallye Lou Trussell*

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### IN MEMORIAM — SALOME (SALLY) FOX — 1912-1980

Popularly known as Sally Fox, Mrs. Salome Fox was born on April 13, 1912 and died in Houston, Texas on September 27, 1980.

In private life Mrs. Fox was the secretary of a local Houston firm for 30 years, and is renowned for her outstanding civic activities and particularly for her leadership in the fields of *Amaryllis* and *Hemerocallis* (Daylilies) promotion. She was *Corresponding Secretary* of *The Greater Houston Amaryllis Club* until her death from cancer. It was her keen interest in civic affairs and floral societies that kept her active until the end.

She accumulated a large collection of Large-Flowering Hybrid *Amaryllis* and Daylilies (*Hemerocallis*), which she enlarged by the addition of the latest available hybrids. She shared her treasures with the many visitors who were welcomed to her garden.

Her love of sharing was evidenced even after her death, when *The Greater Houston Amaryllis Club* and *Houston Hemerocallis Society* were willed many dozens of her most desirable *Amaryllis* and Daylily plants.

She contributed annual articles to PLANT LIFE on *Amaryllis* activities in the Greater Houston area. For her infectious enthusiasm and ever willing help in local and regional activities; for a dear kind and loving

friend, we shall always remember her. — Mrs. Bertha Cone, Corresponding Secretary, 2711 Elysian, Houston, Texas 77009.

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## THE EDITOR'S MAIL BAG

The members will be pleased to hear that Dr. W. S. Flory is recovering from his recent illness.

Dr. Christopher M. Marsh, M.D. of Patrick T. Lai, M.D. Internal Medicine, 1451 S. King Street, Suite 400, Honolulu, Hawaii, 96814, reports as follows as of Sept. 3, 1981:

September 3, 1981

Re: Walter Flory:

To Whom It May Concern;

Dr. Walter Flory was hospitalized at Queen's Medical Center under my care on August 28, 1981 — he was unable to continue his scheduled flight with Qantas Airlines due to a stroke suffered en route from Australia to Hawaii.

He was hospitalized from August 28, 1981, to September 5, 1981, and discharged in satisfactory condition to fly from Honolulu to Los Angeles, and thence to Virginia, with no special precautions required.

If any further questions arise, please contact me at my office.

Sincerely,

Christopher M. Marsh, M.D.

CMM:ek

Dr. Flory, as of Nov. 5, 1981, reports that he is recovering, and contributes the article on the chromosomes of the dwarf *Crinum* from the West Indies introduced by Marcia C. Wilson. The entire membership will join me in wishing for him a speedy and full recovery.

Miss Elizabeth Lawrence, WILLIAM HERBERT MEDALIST of 38 years ago (1943), writes that Sam Caldwell in July 1970 sent her six bulbs of *Lycoris x jacksoniana*. "Today (August 10, 1981) 10 stalks are in bloom." She writes "I am still working on my Market Bulletin manuscript, but I doubt whether I will ever be able to finish it."

Gordon McNeil, Ofcolaco, N. Transvaal, South Africa, in *The Garden* (Jour. Roy. Hort. Soc.), Vol. 107 (Part 1): p. 36, Jan. 1982, writes about crosses between *Nerine krigei*, and *N. platypetala*, with *Brunsvigia grandiflora* and *B. littoralis*. He also mentions crosses of the hybrids with other *Amaryllidaceae*, including crosses with *Clivia*, *Eucharis* (= *Urceolina*), *Crytanthus* and *Crinum*.

Rare magnificent **Paramongaia superba**, 9 blooming size bulbs, recently collected, available at \$60.00 each. Prof. Pierfelice Ravenna, Casilla 21128, Sucursal 21, Chile.

# 1. REGIONAL ACTIVITY AND EXHIBITIONS

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## THE 1981 AMARYLLIS SHOW SEASON

The 1981 *Greater New Orleans All-Horticulture Amaryllis Show* scheduled for April 4, had to be canceled due to earlier unfavorable weather conditions, for the first time since its founding.

The *Houston Amaryllis Society Official Show* 1981 was held on April 3, followed by the 1981 New Orleans Intra-Club Show on April 11; the 1981 *Corpus Christi (Texas) Amaryllis Show* on April 11 and 12, and the *Southern California Hemerocallis and Amaryllis Society Amaryllis Show* on April 17 and 18.

The 1981 *Amaryllis Society of Alabama Show* was staged on May 2.

## 1981 GREATER NEW ORLEANS OFFICIAL ALL-HORTICULTURAL AMARYLLIS SHOW

L. W. MAZZENO, JR.

944 Beverly Garden Drive, Metairie, LA 70002

For the first time in history, the Mens' Amaryllis Club of New Orleans, Inc. canceled its annual show.

The show was scheduled for April 4. As early as three weeks before that date, it was apparent that growth of the bulbs was too slow to produce enough blooms in time for exhibition. However, a final decision was not made until March 25, ten days before the deadline. At that time Club members were contacted regarding their prospective entries. The telephone survey indicated "promises" of not over forty entries. Deeming this far too small a number for a representative exhibition, our Board of Directors canceled the show.

Some folks call it the perversity of something or other, others call it Murphy's Law. But, by any name we always seem to select a Show date that gives us trouble. If we pick an early date, we have a cold winter. If we select a later date, we have a warm one. We just can't seem to overcome the vagaries of nature. Still, hope springs eternal. Everyone is looking forward to next year's Show on April 17, 1982. With all members exerting a little extra effort, and if nature mends her capricious ways, we should have a beautiful exhibition.



HOUSTON AMARYLLIS SOCIETY OFFICIAL SHOW, 1981

MRS. A. C. PICKARD, *Official Show Chairperson*; MRS. TROY WRIGHT, *President*; MRS. R. L. CULPEPPER, *1st Vice President and Staging Chairperson*; MISS MARY NELL PARTIN, *Co-Chairperson*.

The Houston Amaryllis Society's annual official show was held April 3, 1981 at the Garden Center in Houston, Texas. The Society can happily add another successful year to its history which began in 1957.



Fig. 5. Mrs. E. O. Griener, exhibitor of 'Pamela', Queen of Show Gold Rosette and Silver Trophy, Houston Amaryllis Show, 1981.

This year has been an interesting and rewarding one, rich with accomplishments and projects. The popularity of the hybrid *Amaryllis* today has greatly increased the demand for superior quality bulbs for pot and garden culture.

*Amaryllis* shows give the interested individual the opportunity to get a close-up view of the many named clones in a wide color range, including information on their culture.

The show tables were filled with colorful blooms but due to factors beyond our control, the plants failed to qualify for high awards.

The Artistic Section was beautifully arranged by the Chairperson, Mrs. E. L. Blankenship. This class necessitated the use of *Amaryllis* blooms in all arrangements inspiring the use of their supremacy.

Mrs. Troy Wright, Chairperson of the Educational table and information section set up a wonderful display, covering all methods of *Amaryllis* propagation and featuring many plants of the *Amaryllis* Family.

To help defray show expenses, the members donated hundreds of plants, giving the plant enthusiast a choice at a nominal price including cultural information given for each plant. Mrs. A. L. Legatski and Mrs. L. E. Morgan supervised the sales.

The Publicity Chairperson for the Show and *Amaryllis* Society was Mrs. A. A. Brittan. Hostess Chairperson, Mrs. E. L. Hammond, Chairman of Judges, Mrs. H. W. Blair and Guest Registration was handled by Mrs. Suzanne Street and Mrs. E. H. Mayo.

Award—Queen of Show—‘Pamela’, *Gracillis*, Div. 8. Gold Rosette and Silver Trophy to Mrs. E. O. Griener.

Blue Ribbon Winners: ‘Ludwig Goliath’, Mrs. Troy Wright; ‘Apple Blossom’, Mrs. L. E. Morgan; ‘Picotee’, Mrs. A. C. Pickard; ‘Lucky Strike’, Mrs. A. L. Hammond; ‘Belinda’, Mrs. John Williams; ‘Pamela’ (*Gracillis* miniature) Grown by Mrs. E. O. Griener for over 20 years.

A reminder on culture—I would like to repeat again the sure way to lose an *Amaryllis* bulb is to drown or freeze it.

I feel much indebted to all the Society members for their unselfish assistance. We will be seeing you in 1982.

## 1981 NEW ORLEANS INTRA-CLUB SHOW

L. W. MAZZENO, JR.

944 Beverly Garden Drive, Metairie, LA 70002

The failure in having flowers for our scheduled Annual Show resulted in the largest number of entries and the highest quality ever in our Intra-Club Show, held on April 11. Entries were expanded to five categories this year: 4-floret, won by Walter Latapie with an “Apple Blossom”; 3-floret, won by Emile Flauss with “Milady”; 2-floret, won by Victor Pannell with a white seedling; single floret and cut specimens, also won by Emile Flauss with white and red seedlings respectively.

Tim Calamari, Jr. again served as Show Chairman and did his usual excellent job. Our special thanks were given to our three registered judges who gave so unselfishly of their time and efforts on our behalf.



Fig. 6. Left to right, Victor Pannell, Walter R. Latapie, Sr., Emile Flauss, winners at the 1981 Intra-Club Show, Mens' Amaryllis Club of New Orleans.

## 1981 CORPUS CHRISTI (TEXAS) AMARYLLIS SHOW

MRS. CARL C. HENNY, *Corresponding Secretary*  
*P.O. Box 3054, Corpus Christi, Texas 78404*

The Coastal Bend Amaryllis Society held its annual Amaryllis Exhibit on April 11th and 12th, 1981, in conjunction with the "Council of Garden Clubs" Festival of Flowers.

We received only a mild freeze this spring which retarded the growth of plants but later on spring rains helped to encourage the growth of our bulbs and plants. In this part of Texas our weather is very changeable.

In our "named and registered Leopoldii type amaryllis" Mr. and Mrs. Bill M. Miller received the most blue ribbon awards for their entries which were "Royal Dutch" scoring 99 points; Peppermint—scoring 98 points; "Apple Blossom"—scoring 95 points; "Rose Beauty"—scoring 94 points; and their entry in the "Challenge Class" which scored 96 points. Since they had won the "Silver Bowl" Award in 1980, they were not eligible to receive it again this year. They were then awarded a "Special Keeper's Trophy".

Mr. J. M. Mabe, club member, was then awarded the "Silver Bowl Trophy" with his entries of "Beautiful Lady"—scoring 99 points; Lucky Strike—scoring 97 points, and Firefly—scoring 96 points. Since Mr. Mabe had won this Silver Bowl twice previously, he is now entitled to keep this



trophy permanently. He also received the "National Award of Merit" presented by the "Council of Garden Clubs" for his entry of Beautiful Lady—which scored 99 points. The American Plant Life Society and American Amaryllis Society also presented him with "The Award of Merit" for his entry of "Beautiful Lady".

Other members who received blue ribbons for their entries were Mrs. W. E. Douglass, Mrs. Sheriton Burr and Mrs. Carl Henny. Among those entered were "Picotee", "Fire Dance", and an African variety.

Other named and registered scapes entered were: Gipsy Giant, Fairyland, Summertime, Cinderella, Ludwig's Goliath, Rose Marie, and Maria Goretti.

A "Special Trophy Award" was given to Douglass Fuhrmann, non-member, for his entry of "Rose Marie" and an unnamed hybrid.

A "Special Trophy" was also awarded to Mr. and Mrs. Bill Miller for their entries in the "Challenge Class"—which scored 96 points.

Awards of Merit — presented by the "American Plant Life Society and The American Amaryllis Society" — were given to: Mr. J. M. Mabe, club member; Mrs. W. E. Douglass, club member; Mr. & Mrs. Bill M. Miller, club members; Mrs. Sheriton Burr, club member; and: Mark Nichols, (non member); Mrs. Dick Swantner, (non-member); Mr. David Herrin, (non-member).

A "Memorial Trophy" in *Honor of Mr. Duane Echols*, past club president, was presented by the Coastal Bend Amaryllis Society. This "Memorial Trophy" will be used as a "Traveling Trophy" instead of the "Silver Bowl" Trophy, which was won by Mr. J. M. Mabe.

## 1981 AMARYLLIS SOCIETY OF ALABAMA SHOW

MR. FRED D. FAMBROUGH JR., *President*  
231 E. Elm St., Mobile, Ala. 36610

The Amaryllis Society of Alabama, Inc. held its annual Amaryllis Show on May 2nd and 3rd. This year's show was entitled, "Amaryllis and the Good Old Days", and was staged at the Chickasaw Civic Center. Although we had very peculiar weather conditions, there were 106 entries. Mr. C. E. Tagert Sr. served as Show Chairman, assisted by his wife Mrs. Mattie Tagert. Almost every member helped in some capacity prior to or during the Show. Much thanks goes to each of them. Our Show is open to the public and everyone is encouraged to place an entry whether a member or not.

In the official judging, Mr. & Mrs. C. E. Tagert Sr. won The Presidents Award for the most outstanding Dutch seedling hybridized by the exhibitor, The Mr. & Mrs. H. P. Wheat Memorial Trophy for the most blue ribbons in the potted and cut seedling divisions, The Emile Scheurmann Sr. Memorial Trophy for the most blue ribbons in the combined hor-

ticulture and artistic arrangement divisions, The Wilmer Smith Trophy for the most outstanding potted bulb specimen, The First National Bank of Mobile Trophy for the best unnamed seedling, The American National Bank Trophy for the most outstanding potted miniature, The Merchants Bank Trophy for the most outstanding potted double amaryllis, The T. J. Swetman Trophy for the most blue ribbons in the Dutch hybrid potted division, The Vincent Kilborn Sr. Memorial Trophy for the most blue ribbons in the Dutch hybrid cut division, The C. E. Tagert Sr. Trophy for the most blue ribbons in the single bloom unnamed division. The C. E. Tagert Sr. Trophy for the most blue ribbons in the single bloom novelties division. The C. E. Tagert Sr. Trophy for the most blue ribbons in the single bloom named division, and The Claudine Pierce Trophy for the most outstanding collection of three scapes.

Mr. & Mrs. Jeff Brown Jr. won The Central Bank of Mobile Trophy for the most outstanding potted American specimen and The Mae Brown Trophy for the most outstanding potted bulb specimen of American amaryllis.

Mrs. Barbara Price won The Martha Burdette Memorial Trophy for the most blue ribbons in Divisions 5 & 6.

Mr. Fred D. Fambrough Jr. won The Amaryllis Society of Alabama, Inc. Trophy for the most outstanding specimen of a two floret variety and The Velma Thompson Trophy for the most outstanding artistic arrangement in the Show.

Although we had our doubts, the Show turned out to be a real success. Finally, we would like to thank the judges, members of The Hattiesburg Amaryllis Society, who give unselfishly of their time every year. Their contribution is greatly appreciated.

## SOUTHERN CALIFORNIA HEMEROCALLIS AND AMARYLLIS SOCIETY AMARYLLIS SHOW 1981

KENNETH MANN,  
2195 E. Orange Grove, Pasadena, CA 91104

The seventeenth Annual Show of the *Southern California Hemerocallis and Amaryllis Society* was held at the Los Angeles State and County Arboretum in the New Environmental Building on April 17 and 18, 1981. The new building provides better lighting, with 50 percent natural light, and more room for the visitors to move freely and easily to view the show.

As in the past, the flower show belonged to Dee Cothran, who brought more plants than all other entries combined and who won all major awards except one. Dee can be seen in Fig. 6a top, on the far right, discussing his entries with one of the visitors to the show early Sunday morning. This picture presents a view of the display room of the new building. Several of





Fig. 6a. Exhibits at the 1981 Southern California Amaryllis Show: **Top**, part of general exhibits; **2nd from top**, Cora Doran's Popularity Poll seedling winners; **3rd from top**, C. D. Cothran's award winning seedlings, and **bottom**, J. L. Doran's display of *Amaryllis* species. Photos by Phil Rosoff.

Dee's award-winning *Amaryllis* can be seen in Fig. 6a, third from top. Dee is very generous with his stock. Seeds and bulbs from his crosses are found on the plant table throughout the year. Thus, the results of his many years of work in hybridizing shows in the plant collections of the members. It is his seedlings that are the perennial winners of the hybridizer's award.

The popularity poll was won by Mrs. Cora Doran for the flower shown on the left in Fig. 6a, second from the top. Mrs. Doran raises rare *Cyrthanthus* and brings them to the meetings for auction and to the plant table. Fig. 6a, bottom, shows the species of *Amaryllis* brought to the show by Leonard Doran who maintains a greenhouse devoted mostly to species. These plants were collected in South America by Leonard.

Other awards were presented to Herman Mathis who has developed a strain of *Amaryllis* which produces more than 4 florets per stalk, often up to 7 and even sometimes 9 florets.

A special rosette was presented to the *Huntington Botanical Gardens* for a large number of seedlings given for background display. The Society is grateful for the generosity of Jim Bauml, botanist at the *Huntington*, for permission to cut flowers for our show each year. Member Pat Schlicheter received a rosette for a display of *Amaryllis* from her commercial garden in Upland. Pat has a Masters Degree from Cornell in Horticulture and has started a commercial wholesale business, raising both field-grown and greenhouse-grown *Amaryllis*. We expect to see a lot of Pat and her new seedlings in future shows.

The author thanks the members who assisted in the show and worked as judges. In particular the Society as a whole would like to express special thanks to two of its members: first, to Gladys Williams for her efforts to keep the Society and show going; second, to Dee Cothran who has so generously provided so many flowers to all of the shows for many years. It is the efforts of members like these that has raised the membership of the Society to approximately 170 members.

## WESTERN AUSTRALIA AMARYLLIS SHOW—1981

MRS. J. TONDUT, *Honorable Secretary*,

*Western Australia Gladiolus, Dahlia and Amaryllis Society*

In reporting on this inaugural State Championship for *Amaryllis* in Western Australia it is but fitting to give you some details in respect to our geography and climate.

Western Australia comprises the Western one-third of Australia and is some 1,500 miles from North to South and 700 miles East to West. It embraces many climates from the tropical North and arid deserts to the temperate South.

Total population is 1¼ million. The Capitol, Perth, with its environs, has a population of approximately half a million and enjoys a long dry summer and a relatively warm and short frost-free wet winter. Rainfall is 36 inches for year, falling mainly May to September.

*Amaryllis* are becoming very popular and grow easily here, flowering from late September to early November.

The *Amaryllis Show* was held in the central concourse of a large suburban shopping centre at Booragoon *in conjunction with the State Gladiolus Championship*. The schedule covered various classes and the winners of the classes were as follows:

**STATE CHAMPIONSHIP:** 4 Pots Distinct, Winner Mr. R. J. Larsson; 3 Pots N.N.D., Mr. R. J. Larsson; 1 Pot Light Shade, Mr. D. J. Samson; 1 Pot Dark Shade, Mr. W. A. Manning; 3 Cuts Distinct, Mr. D. J. Samson; 3 Cuts N. N. D., Mrs. E. Humphreys; 6 Florets Distinct, Sir Crawford Nalder.

The Champion Bloom of the Show was a seedling grown by Mr. R. J. Larsson and was a worthy winner against many blooms of Dutch and South African origin.

The Championship attracted 8 entries and a total of 95 pots were on display for the 3 days 15th, 16th and 17th October. Many thousands of people saw the display and a great deal of interest was aroused in this specialist flower.

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#### NOTE TO AMARYLLIS SHOW ORGANIZERS

It is important to designate some one to write a *brief* review of the official show, and to send this promptly to Dr. Hamilton P. Traub, Editor, *Amaryllis Year Book*, 2678 Prestwick Court, La Jolla, Calif. 92037. *Your plans are not complete until this appointment has been made.* Only in this way is a permanent international record of your show assured.



## 2. LINEAGICS

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

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### CHROMOSOMES OF A DWARF *CRINUM* FROM THE WEST INDIES

WALTER S. FLORY,  
*Wake Forest University*

In the summer of 1979 Mrs. Marcia C. Wilson sent us a bulb of a dainty dwarf *Crinum* which had come from the West Indies. This flourishes quite well when grown in four-inch pots in the green-house, where our original bulb has now proliferated to four. The longest leaves are less than 6 inches (14 cm) in length, and considerably under a cm in width—making this a most distinctive taxon for this genus.

We have examined its somatic chromosomes, and while these still need considerably more study, Dr. Traub has requested that a preliminary report be made on this dwarf form at this time.

#### PREVIOUS CYTOLOGICAL STUDIES ON *CRINUM*

Nagao and Takusagawa (1932) were the first to make a cytological study on *Crinum*, and at that time they reported a  $2n$  number of 22 for *C. asiaticum*. That count has been verified in studies by at least seven other workers. Subsequent investigations has revealed that 22 is a rather constant somatic number for the genus. At least 32 other *Crinum* species are known to have 22 somatic chromosomes. Three of the species with  $2n = 22$ , also have forms with  $2n = 33$  chromosomes. There are two species, *C. amabile* and *C. macrantherum*, in which only  $2n = 33$  forms are known.

In 1962 Fernandes and Neves reported *C. bulbispermum* to have a  $2n$  of 66, although Gouws (1949) had earlier assigned the number  $2n = 72$  to this species. It may be mentioned that many variants and hybrids, tracing from *C. bulbispermum*, are grown as horticultural cultivars. The number 66 is in the euploid series with 22, and is most likely to be the most frequent number for *C. bulbispermum*. However, Sharma and Bhattacharya (1956) working with nine different species of *Crinum* found that "all the species of *Crinum* (which they studied) show variations in their chromosome number in the cells of even the same root-tip." This observation may account for Gouws count of 72. Also it may account for some of the horticultural variants!

Sharma and Bhattacharya, l.c., found that in the 9 taxa they studied all had 2 larger, 14 medium-sized, and 6 smaller chromosomes, making for a  $2n$  of 22 in each taxa. However, there was some variation in size of the medium-sized chromosomes. In four species 8 of the medium-sized chromosomes were larger than the other 6. In four other species there were 10 of the medium-sized chromosomes which were larger than the other 4; and in one of these cases—*C. amnochoroides*—one of the designated medium-sized chromosomes was almost as large as the two largest chromosomes. In only one species was there 8 smaller and 6 larger chromosomes among the medium-sized ones.

#### CHROMOSOMES OF THE DWARF WEST INDIAN CRINUM

As the accompanying figure shows there are 22 somatic chromosomes in this taxon. Of the 6 metaphase figures studied in detail from root-tip cells, all had a  $2n$  of 22 chromosomes.

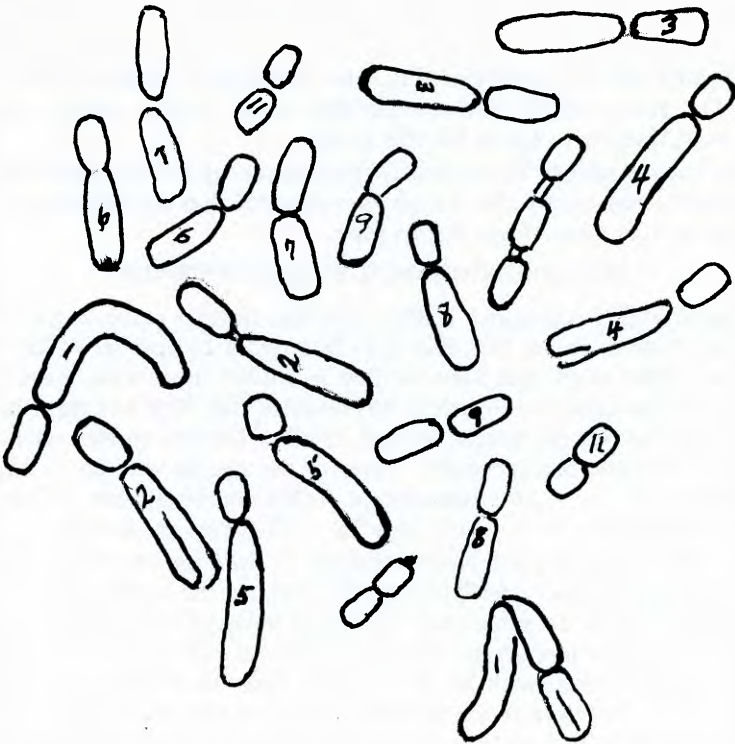


Fig. 7. Chromosomes of dwarf West Indies *Crinum*.

In comparative size the chromosomes of the dwarf *Crinum*, as pictured in the accompanying figure, are in the main quite similar to the descriptions



and figures of Sharma and Bhattacharya (l.c.) for the species they worked with. Our dwarf *Crinum* has two chromosomes which are larger than the other 20, and approximately 16 medium-sized chromosomes. There are 3 smaller chromosomes. The 22nd chromosome, at least in several of the clearest complements observed, is composed by three approximately equal parts. This has the appearance of one of the smaller two-armed chromosomes to which a satellite is attached which is as large as the individual arms of the chromosome.

This three-parted chromosome could involve a duplication or, what seems more likely, a translocation of all, or nearly all, of one of the arms of a shorter chromosome.

In addition the two longest chromosomes differ somewhat in length, and also at least two pairs of the medium-sized chromosomes are of noticeably different lengths. This is suggestive of other translocations. It is conceivable that such translocations play a part in the consequent diminutiveness of the taxon.

It has been pointed out earlier that Sharma and Bhattacharya (1956) found variations in numbers of chromosomes in some of the different cells of even the same root-tip, in the *Crinums* they examined. With this in mind it seems desirable to examine in detail the chromosomal makeup of a number of additional cells before reaching a final decision on the exact cytological situation in this dwarf *Crinum*.

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## CHROMOSOME COUNTS FOR SIX *AMARYLLIS* TAXA

MARGOT WILLIAMS\*

In recent years, our knowledge of the chromosome numbers of *Amaryllis* species has increased considerably. Very recently, Flory and Coulthard (1981) published new reports for 14 species, including two species with  $2n = 24$ , a number never before encountered in *Amaryllis*. In this report, chromosome numbers for 6 taxa of *Amaryllis* not previously reported are presented, including one with another aberrant (aneuploid) chromosome number,  $2n = 25$ .

### MATERIALS AND METHODS

The plants studied and their sources are listed in Table 1. Root tips in active growth were collected and pretreated with 0.2% colchicine in aqueous solution. They were removed from the colchicine and placed in a fixative solution of 1:3 acetic acid:ethanol. Following storage at room temperature for 12 hours, they were refrigerated until observed.

Preparations for study were made by cutting off the terminal 1-2 mm of the root, heating gently in acetocarmine while stirring gently with a steel needle until the stain darkened, and then squashing in a drop of 45% acetic acid with a small amount of acetocarmine added.

Slides were examined on an American Optical Phase Star microscope and drawings of good spreads were made using the American Optical Drawing Attachment, at a magnification of 3000X. Karyotypes were constructed from the resulting drawings, with the chromosomes arranged in descending order of size.

TABLE 1

Accession Number	Species	Source
B63066	<i>Amaryllis brasiliana</i> Traub & Doran	Wilson
B62928	<i>A. corriensis</i> Bury	Dorn
B62870	<i>A. "corriensis var. compressa"</i> Blossfeld	Bell
B62787	<i>A. elegans</i> Sprengel var. <i>ambigua</i>	Bell
PI 247960	<i>A. psittacina</i> Ker-Gawler	USDA**
B62918	<i>A. traubii</i> f. <i>doraniiana</i> Moldenke	Wilson

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\*\*Brazil. Collected in the wild by Llewelyn Williams, agricultural explorer, New Crops Research Branch, Crops Research Division, Beltsville, Maryland. Received May 18, 1958.

TABLE 2

Species	Somatic Chromosome Number
<i>Amaryllis brasiliana</i>	2n = 22
<i>A. corriensis</i>	2n = 22
<i>A. "corriensis var. compressa"</i>	2n = 22
<i>A. elegans var. ambigua</i>	2n = 22
<i>A. psittacina</i>	2n = 22
<i>A. traubii f. doraniana</i>	2n = 22

## RESULTS

Chromosome drawings and the karyotypes derived from them are illustrated in 8A-13B. Chromosome numbers obtained are summarized in Table 2. Five of the six taxa examined had the typical diploid chromosome number for *Amaryllis*,  $2n = 22$ . However, the sixth, *A. "corriensis var. compressa"* (the correct identity and taxonomic placement of this plant has yet to be established), had a somatic chromosome number not yet reported in the genus,  $2n = 25$ . Its karyotype is similar to that of other *Amaryllis*, and is strikingly similar to that of *A. corriensis* Bury except for the three extra chromosomes. Among these three chromosomes is a pair of very short chromosomes which are somewhat similar to those reported by Flory and Coulthard (1981) in *Amaryllis moreliana* (Lemaire) Traub and *Amaryllis "atibaia"* (Blossfeld). However, in the present case, the two chromosomes have median centromeres, and appear smaller in comparison with the other chromosomes than those observed by Flory and Coulthard. The third extra chromosome is a short subterminal one, which is unpaired.

A karyotype analysis was made for each plant studied, using the constructions made from the original drawings. In general, karyotypes followed the pattern described by Flory and Coulthard (1981), with 14 longer chromosomes and 8 shorter ones. Exceptions were *Amaryllis elegans* Sprengel var. *ambigua* and *Amaryllis psittacina*, both with 13 longer and 9 shorter chromosomes; and *A. "corriensis var. compressa"* with 14 longer and 11 shorter ones. However, this last example can be considered to fit the usual pattern if one disregards the extra chromosomes.

## DISCUSSION

The discovery of *Amaryllis* taxa with chromosome numbers greater than 22 but below the triploid level suggests several possibilities about their mode of origin. These taxa may have arisen by misdivision at meiosis, or they may have arisen as hybrids between diploid species and those of higher ploidy—possibly triploids, where unequal division at meiosis and resultant gametes with widely varying chromosome numbers are to be expected. This possibility may be supported by the author's observation that triploids in the genus are frequently pollen-fertile, and occasionally even set viable self-



Fig. 8A. Drawing of root tip cell of B63066, *Amaryllis brasiliana*, at metaphase, showing  $2n = 22$  chromosomes.

Fig. 8B. Chromosomes from Fig. 8A arranged in decreasing order of size.



Fig. 9A. Drawing of root tip cell of B62928, *Amaryllis corriensis*, at metaphase, showing  $2n = 22$  chromosomes.

Fig. 9B. Chromosomes from Fig. 9A arranged in decreasing order of size.



Fig. 10A. Drawing of root tip cell of B62870, *Amaryllis* "corriensis compressum", at metaphase, showing  $2n = 25$  chromosomes.

Fig. 10B. Chromosomes from Fig. 10A arranged in decreasing order of size. Note satellite on chromosome 11.



Fig. 11A. Drawing of root tip cell of B62787, *Amaryllis elegans* var. *ambiguum* at metaphase, showing  $2n = 22$  chromosomes.

Fig. 11B. Chromosomes from Fig. 11A, arranged in decreasing order of size.





Fig. 12A. Drawing of root tip cell of P1 247960, *Amaryllis psittacina*, at metaphase, showing  $2n = 22$  chromosomes.

Fig. 12B. Chromosomes from Fig. 12A, arranged in decreasing order of size.



Fig. 13A. Drawing of root tip cell of B62918, *Amaryllis traubii* f. *doraniana*, at metaphase, showing  $2n = 22$  chromosomes.

Fig. 13B. Chromosomes from Fig. 13A, arranged in decreasing order of size.

pollinated seed. A third possibility is that the "tetraploid" species of *Amaryllis* were the ancestral types from which the diploid species arose by reduction. There are several points in favor of this latter hypothesis. One is that the tetraploid species are self-fertile, while the great majority of diploids are not. In species where naturally occurring diploid and polyploid forms are known, the polyploids are, in my experience, self-fertile, while the diploids are not. In addition, many of the tetraploid species have anatomical characteristics which are primitive, such as long stigma lobes, or occasionally, styles that look like three joined together, each terminating in a long stigma lobe. This character may be a remnant of a forerunner of *Amaryllis* with one style for each locule.

The true significance of the 24 and 25 chromosome *Amaryllis* will not be understood until we have a more complete picture of the variation in chromosome number to be found in the genus. It is to be hoped that the task can be accomplished before too many more *Amaryllis* habitats in South America are destroyed.

#### REFERENCE

Flory, W. S. and R. F. Coulthard, Jr. 1981. New Chromosome Counts, Numbers, and Types in Genus *Amaryllis*. *Plant Life* 37:43-56.

## THE HABITAT OF AMARYLLIS VITTATA IN PERU

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One endemic area of *Amaryllis vittata* L'Herit. is between the Cordillera Central and Cordillera Oriental—main ribs of the Andes with some peaks having an elevation over 20,000 feet. The Huallaga River is one of the two large rivers that form the Amazon about 200 miles to the north where it joins the Marañon. Soil in the area is typical red tropical clay of 1:1 ratio (entirely different to temperate area clays). Temperate clays are of 2:1 ratio but tropical 1:1 clays have had centuries of leaching which removes silicate and leaves higher ratios of iron and aluminum. They are not sticky like temperate area clays. If there are a few days without rain, the surface dries out, and dust drifts into everything—you and everything you have turns red. It is impossible to wash it out of one's possessions. There are no flat areas, and every thing grows on slopes. There are plenty of trees, but bulbs always grow in open spots where they get lots of sun, often on rocky outcrops where larger plants do not prosper.

*Amaryllis vittata* L'Herit., Doran No. 1411, (Traub Herbarium No. 1084a & 1084b), was collected in Peru in the open canyon wall at Huicongo-Jaunjui, in 1964.

Prof. Pierfelice Ravenna has reported that *Amaryllis vittata* has also been collected in Brasil.

### SEEDS OF AMARYLLIS AND WORSLEYA RAYNERI

Mr. J. L. Doran, of Burbank, California, sent in seeds of 14 *Amaryllis* species, and *Worsleya rayneri*, which were mounted, and are shown in Figure 14.

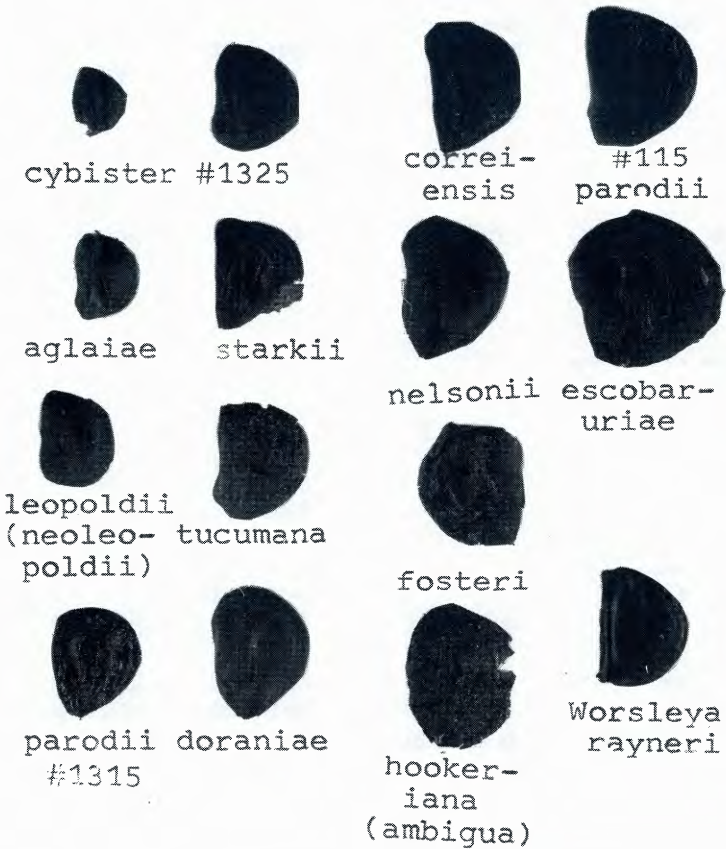


Fig. 14. Seeds of 14 *Amaryllis* species, and *Worsleya rayneri*, grown by J. L. Doran of Burbank, California.

*HYMENOCALLIS MAXIMILIANII* HOWARD, SP. NOV.

T. M. HOWARD

*HYMENOCALLIS MAXIMILIANII* Howard tubo tepalorum 12—19 cm. longo, segmentis 8—10.2 cm. longis, 5mm. latis, cupula 2—2.2 cm. longa, 2—3.5 cm. lata, ovulis per loculum 3.

**HOLONOMENIFER:** Traub No. 1249 a&b, late June Early July, 7-5-68; Mexico, State of Guerrero, Howard No. 68-220.

**DESCRIPTION:** *Habitat:* State of Guerrero, Mexico, in creek-beds around Chilpancingo, and coastal roadsides (Mexico 200) in open pastures southeast of Acapulco, on road to Pinotepa Nacional, in full sun in black clay soils of seasonally wet flood plains in coastal Guerrero; flowering 5 July 68, and early July, 1970. (*Cultivated:* San Antonio, Texas.) *Bulb:* Subglobose, black-coated, 4.5 cm broad and 4 cm long, with short neck. *Scape:* compressed, with two edges, 41 to 58 cm long, 4 to 11 fld. *Leaves:* 6 to 8 in number, bright green, linear-lorate, narrowly acute, strongly keeled centrally, 6.2 to 6.5 dm long and 2.3 cm wide, sessile to subsessile. *Flowers:* Floral bracts: 6.5 cm long and 2.3 cm wide at the base. Flowers: fragrant, 4 to 11 fld.; Tube: straight, greenish, 12 to 19 cm long. Segments: 8 to 10.2 cm long, and .5 cm wide, spreading; Cup: at first funnel form, later becoming rotate, margins erect and later spreading, toothed and fringed, 2 to 2.2 cm long and 2 to 3.5 cm wide, from short tubulose base. White. Not adnate to the segments. Filaments: green, 4.5 to 5.5 cm long, anthers versatile, pollen orange. Stigma capitate, small, overtopping the anthers. Ovules: three per locule. Seeds 2.5 cm long and 1.5 cm wide, oval, pointed at the base, dark shiny green. Float in water.

**Notes:** Common along coastal roadside south east of Acapulco in wet pastures. Also in streams around Chilpancingo.

*H. Maximiliani* seems to be endemic only to the Southern part of the State of Guerrero. It is a very easy plant in cultivation, flowering freely under ordinary garden conditions, and increasing rapidly by offsets and by seeds. It is named for Emperor Maximilian. An Austrian, Hapsburg, a tragic figure in the Mexican revolution, and the husband of the mad Carlotta. Emperor Maximilian was executed on a hill at Queretaro at the age of thirty five. Although a decent man, Mexico was trying to overthrow the last attempt at European rule and royalty. Other plants have been named in honor of Maximilian and it seems appropriate that a *Hymenocallis* species also honor a man who played an important part of Mexico's tragic history.

*Hymenocallis Maximilianii* seems not to be endangered at this time, as it normally grows in habitats too wet for cultivation, although it is uncertain as to how tempting it may be for livestock. Normally livestock graze around its colonies, preferring the abundant grasses that share its habitat.

## CONTRIBUTIONS TO SOUTH AMERICAN AMARYLLIDACEAE IX\*

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### ABSTRACT

Eleven new species of South American Amaryllidaceae, namely, *Crinum salsum*, *Amaryllis maumbiensis*, *A. teyucarensis*, *A. hemographes*, *A. caiaponica*, *Habranthus maranensis*, *Urceolina astrophiala*, *U. moana*, *U. ipariensis*, *U. ayacucensis*, and *Paramongaia superba*, are described. The latter one represents the first record of the genus *Paramongaia* in Bolivia. The other species belong in the floras of Argentina, Brazil, Ecuador, and Peru.—An *Amaryllis* collected by Blossfeld (1979) at Pedra Grande, near Atibaia, Sao Paulo, Brazil, and supposed by him to be *A. vittata* L'Her. var. *tweediana* (Herb.) Traub, is identified as *A. moreliana* (Lem.) Traub. A color-photo from Mr. Blossfeld, was compared with the original illustration of *A. moreliana*, for this purpose.—A consideration on *Urceolina urceolata* (Ruiz et Pav.) Pax, and *U. microcrater* Kraenzl., in connection to their distribution and distinctive characters, is exposed. A table of contrasting characters, and a figure of *U. microcrater*, are given.—The genus *Urceolina* is recorded for the first time in the Bolivian flora.

### TABLE OF CONTENTS

- I. A new *Crinum* species from South Brazil
- II. Studies in the genus *Amaryllis*
- III. A new *Habranthus* from the Brazilian middle-north
- IV. Revisional studies in the genus *Urceolina*
- V. A new species of *Paramongaia* from Bolivia

### I. A NEW CRINUM SPECIES FROM SOUTH BRAZIL

Among the Amaryllidaceae received for study from the Brazilian states of Santa Catarina (Herbário Barbosa Rodrigues, Itajaí'), and Paraná (Muséu Botânico Municipal, Curitiba), some specimens proved to belong to an undescribed *Crinum*.

*Crinum salsum* Rav. sp. nov. (Fig. 15)  
(subgeneris *Crinum*)

Species a *Crino erubescenti* proxima sed statura minore, bulbo debili in pseudocollo aereo haud producto, follis lineari-ensiformibus, floribus gracilioribus tepalis angustioribus, recedit.

Plant up to 50-80 cm high. Bulb oblong, to 10 cm long, 3-4 cm wide, producing thick, fleshy roots at its base. Aerial neck absent. Leaves ensiform or linear-ensiform, suberect, or spreading obliquely, dark green, channelled, to 40-90 cm long, 1.5-3.5 cm broad, the margins minutely denticulate. Scape cylindrical, green, 50-70 cm long. Spathe valves lanceolate, greenish, subequal, 5.5-8 cm long, the outer somewhat broader and with involute margins; inner bracts narrowly lanceolate, to linear-filiform, 6-7.5

\* Due to a print mistake, the last series of this work (in Plant Life 1981) appears as part seven, instead of the eighth.



cm long. Inflorescence 2-5-flowered. Flowers sessile, erect or suberect. Ovary oblong, green, to 10-11 mm long, 3 mm wide. Perigone tube greenish, 8.5-13.3 cm long, Tepals narrowly oblanceolate to almost linear, moderately recurved, white, the keel reddish, to 7-8 cm long, 7-10 mm



Fig. 15. *Crinum salsum* Rav., as photographed in its native habitat in Brasil. Photo by P. Ravenna.

broad. Filaments filiform, thin, dark red, spreading upward, to 52-56 mm long. Anthers linear, versatile, to 11-16 mm long. Style filiform, dark red, to 16-21 cm long from the ovary. Stigma capitate.

Habitat.—The species inhabits South Brazil, in bogs, river banks, and

estuaries that are periodically invaded by flood tides from the sea. Also on the sandy sea-shores, among rocks flushed by waves, and sometimes in the mangrove environment. It ranges from 24° to 27° 40' of longitude, and probably further south.

Specimens: Brazil, São Paulo, Santos; leg. Mosen 2974, 10-XII-1874. (S,R). Paraná, mun. Antonina, Antonina, frequente em banhado; leg. Y. Saito 1076, 20-XII-1964 (IDPN 8924 in MBM). Idem, mun. Guaratuba, Rio Sai; leg. Ravenna 1004 cum G. Hatschbach, 20-XII-1968 (Herb. Ravenna, type). Idem *ibid.*; leg. Hatschbach 20640, com P. Ravenna, 20-XII, 1968 (MBM). Santa Catarina, mun. Itajaí, margem do rio; leg. R. M. Klein 2071, 29-V-1956 (HBR). Idem, Rio Seruí, Garopaba; leg. A. Bresolin 183, 16-III-1971 (HBR). Idem, mun. Florianópolis, Canavieiras; leg. L.B. Smith & P.R. Reitz 12275, 28-III-1957 (HBR). Idem, mun. Florianópolis, Ilha de Santa Catarina, Rio Tavares; leg. P.R. Reitz & L.B. Smith 6189, 13-II-1952 (R, HBR). Rio Grande do Sul, Além Cabeçudo; leg. H. Sick B-872, 8-II-1966 (HB).

*Crinum salsum* appears as related to *C. erubescens*, a common species in the Amazon basin; the latter however, bears a stoloniferous bulb, usually prolonged into an aerial neck, and coarser lanceolate leaves. *Crinum comelyonii* Jacq., supposedly from the Amazon valley (Baker 1888), might be allied to *C. americanum*, if not identical to the latter species. Baker's reference of above, is probably to be referred to a misidentified specimen of *C. erubescens*.

The distinction between subgenera *Stenaster* and *Crinum*, appear so slight and inconsistent, that eventually could be considered as a sole unity. Thus, I have placed *C. salsum* in subgenus *Crinum*.

## II. STUDIES IN THE GENUS AMARYLLIS

### 1. New species from South Brazil and Argentina

To the previous species already proposed by me from the states of Paraná and Santa Catarina, namely, *A. iguazuana*, *A. rubropicta*, *A. guarapuavica*, *A. gertiana*, and *A. curitibana* (see Ravenna 1971, 1974, and 1979), I must add now the following:

#### *Amaryllis maumbiensis* Rav. sp. nov.

Species ab *Amaryllide iguazuana* et *A. curitibana* proxima sed bulbo debili et floribus semiapertibus uniformiter rubri recedit.

Plant up to 41 cm high. Bulb ovoid, weak, to 5.5-6 cm long, 3 cm wide, covered by few dry coats, and prolonged into a 4-4.5 cm long pseudoneck. Leaves about 2 at anthesis, narrowly oblanceolate, acute, flaccid, to 42-50 cm long, the blade ca. 3 cm broad. Scape to 33 cm long. Spathe valves lanceolate, 48-55 mm long. Pedicels 15-25 mm long. Flowers ascending. Ovary ellipsoid to obovate-ellipsoid, 9-11 mm long, 3.5-4.5 mm wide. Perigone bright red, paler toward the base, to 7.5-8.5 cm long, 5-6.5 cm wide at the apex. Basal ring to 5 mm long. Filaments declined-ascending, reaching

to the mouth of the perigone; the lateral-episepal pair 60-64 mm long, upper episepal one 64-67 mm long, the lower epipetal one to 67-70 mm long, lateral epipetal pair 70-75 mm long. Anthers lunulate-oblong, to 6-6.3 mm long. Style filiform, 10-18 cm long, declined-ascending. Stigma trifold, its lobes 2.2-2.5 mm long.

Specimens: Brazil, Paraná, mun. Morretes, Serra de Maumbi', picada ao Olimpo; leg. Hatschbach 24191, 24-IV-1970 (Her. Ravenna, type, MBM, isotype).

Belonging in Series Aviflorae, *Amaryllis maumbiensis* appears as related to *A. iguazuana* Rav. (Argentina, Brazil), and to *A. curitibana* Rav. However, the weak bulb, and the scarcely open, uniformly red flowers, distinguish it well from all the species of the series. *A. heuseriana* (Karst.) Rav. displays a similar habit, but this is an ally of *A. aulica*, and bears much larger flowers.

*Amaryllis teyucuaensis* Rav. sp. nov.

Species ex colore ab *Amaryllide iguazuana* similis sed flore magis aperte lobis stigmae valde brevioribus foliis multo latioribus differt. Folia ensiformia leviter falcata circ. 55-70 mm lata. Inflorescentia biflora. Perigonium rubro-roseum rubro venato ad 10-12 cm longum circ. 7-8 cm latum.

Plant probably up to 50 cm high. Bulb not seen. Leaves large, lorate, slightly falcate, almost flat, to 63-70 cm long, 55-70 mm broad. Scape apparently pruinose. Spathe valves subequal, lanceolate, to 50-62 mm long; inner bract single, filiform, 3 cm long. Inflorescence two-flowered. Pedicels stout, 55-68 mm long. Ovary oblong or obovate-ellipsoid, 12.5-13.5 mm long, 3-5 mm wide. Perigone rose-red, dark-red-nerved, to 10-12 cm long, 7-8 cm wide. Tepals joined at the base for 10 mm, greenish at the base and at the keel except for the apex, the upper outer one 9.5 cm long, 4.5 cm broad, the lower outer pair slightly asymmetric at the apex, 10 cm long, 4 cm broad, lateral inner pair 9.5 cm long, 3.5-4 cm broad, lower inner one oblanceolate, horizontal, 9.8 cm long, 2 cm broad. Filaments ascending curvely, the upper episepal 70 mm long, lateral episepal pair 73 mm long, lower epipetal pair 75 mm long, lateral epipetal 85 mm long. Anthers oblong-reniform, yellow, 4-5 mm long. Style ascending, 10.7-11 cm long. Stigma shortly tri-lobed; lobes 1.3-1.5 mm long.

Habitat.—In rich dark soil, between rocks, at Peñón Reina Victoria near Teyucuaré, in the province of Misiones, Argentina.

Specimens: Argentina, prov. Misiones, Teyucuaré, Peñón Reina Victoria; leg A. Schinini 5502, 25-IX-1972 (Herb. Ravenna, type; K, and CTES, isotypes).

*Amaryllis teyucuaensis* appears as related to *A. iguazuana*, to which it resembles in the flower color, as well as to *A. rubropicta*, and *A. curitibana*.



It is distinguished from all of them by the unusually broad leaves.

*AMARYLLIS HEMOGRAPHES* RAV., *SP. NOV.*

Species ab *Amaryllide aviflora* et *A. rubropicta* affinis sed floribus longioribus, perigonii tubo distincto, tepalis crassioribus et lobis stigmae longioribus recurvibusque recedit.

Plant up to 90 cm high (acc. to collectors). Bulb not seen. Leaves spreading, oblanceolate, much narrowed downwards, to 49-53 cm long, 40-53 mm broad; the lower narrowed part much channelled, the apex subacute. Scape stout, to 72 cm long, 20 mm across at the base. Spathe-valves lanceolate, marcescent, 6-7 cm long. Inflorescence two-flowered. Pedicels ca. 25-32 mm long. Ovary oblong or obovoid-oblong, to 14-15 mm long, 4-6 mm wide. Perigone scarcely open, ca. 7 cm wide, the tube to 20 mm long, 4-6 mm wide. Tepals rather dissimilar in shape, green, veined red especially on sides and apex, the edges wavy; the upper outer one broadly oblanceolate, to 9.5-10 cm long, 35 mm broad; lateral outer pair markedly asymmetric in shape, closely contiguous and subtending the lower inner one, their apices connivent, to 8.5-9.3 mm long, 38-40 mm broad; lateral inner pair oblanceolate, moderately diverging, 10-17 cm long, 21-24 mm broad; lower inner one narrowly oblanceolate, horizontal, to 8.5 cm long, 8-9 mm broad, acute. Filaments archedly ascending; the lateral episepal pair 57 mm long, upper episepal 62 mm long, lower epipetal 70 mm long, lateral epipetal pair 75 mm long. Anthers reniform-oblong, yellow, 4.5-5.5 mm long. Style ascending, 94 mm long. Stigma trifid, lobes recurved, ca. 3 mm long.

Specimens: Brazil, Santa Catarina, São Joaquim, Bon Jardim; leg. P.R. Reitz 7367, 20-XI-1968 (HBR, type).

Closely allied to *A. aviflora* Rav., and *A. rubropicta* Rav., the present species differs from both in the longer flowers with a definite perigone-tube, coarser tepals, and longer, recurved stigma lobes.

*AMARYLLIS CAIAPONICA* RAV., *SP. NOV.*

Species ab *Amaryllidis rubropicta hemographes* et *curitibana* similis sed flore magis aperto ad apicem colore uniformiter rubro pariter haud venato recedit. Folia ad anthesin nulla. Inflorescentia biflora. Perigonium ad 11-11.5 cm longum circ. 6-9 mm latum. Perigonii tubus infundibulatus ad 11-16 mm longus. Tepala circ. 10 cm longa, exteriora-lateralia asymmetrica infra interiori-inferius contigua. Filamentia et stylus curvate ascendunt. Lobi stigmae perbrevis ad 1.3-1.5 mm longi.

Bulb ovoid, to 10 cm long, 5.5-6 cm wide, produced into a short pseudoneck. Leaves none at anthesis. Spathe valves subequal, lanceolate, to 8-8.3 cm long; inner bracts two, subfiliform, to 55-60 mm long. In-

florescence two-flowered. Pedicels 8-8.5 cm long. Ovary oblong-ellipsoid or obovate-ellipsoid, 13-14 mm long, 4.5-5 mm wide. Perigone 11-11.5 cm long, 6-9 mm wide, green, except for the red apex. Perigone tube funnel-shaped, to 14-16 mm long. Tepals oblanceolate, rather dissimilar, ca. 10 cm long; the upper outer one 40-44 mm broad, lateral outer pair asymmetric, 28-30 mm broad, lateral inner pair 26 mm broad, lower inner one horizontal, 16-20 mm broad. Filaments declined-ascending; lower episepal pair 75 mm long, upper episepal one 80 mm long, upper episepal one 86-88 mm long, lateral epipetal pair ca. 90 mm long. Anthers oblong-reniform, 6-7 mm long. Style curvly ascending, to 10.5-11.6 cm long. Stigma shortly trilobed; lobes 1.3-1.5 mm long.

Habitat.—Savanna (“cerrado”) at the border of galery forest, near Caiaponia, State of Goiás, Brazil.

Specimens: Brazil, Goiás, Caiaponia, arrededores; leg. Hatschbach 37711, 19-XI-1975 (Herb. Ravenna, type; MBM isotype).

*Amaryllis caiaponica* belongs in the series *Aviflorae*, being related to *A. rubropicta* Rav., *A. hemographes* Rav., and *A. curitibana* Rav. From these is separable by the wider flowers, uniformly red-tinged at the apex, and apparently not red-veined. The plant bears no leaves at the flowering time.

## 2. Reidentification of *Amaryllis Moreliana*

### *Amaryllis moreliana* (Lem.) Traub

Traub, *Herbertia* 13: 102, 1948.—*Hippeastrum morelianum* Lemaire, L'Hort. Universal 4: 37, fig., 1845.

Lemaire described the species from living plants cultivated in Belgium, from bulbs collected by Linden in Brazil. No precise data of location were at the time given.

Blossfeld (1979), reported an *Amaryllis* species, which he collected at Pedra Grande, near Atibaia, State of São Paulo. He refers to Hoehne as assigning to *A. vittata* L'Her. var. *tweediana* (Herb.) Traub (as *Hippeastrum ambiguum* var. *tweedianium*) a plant collected in the same locality. Hence, Blossfeld identifies his plant with the above name. Fig. 3, however, shows a quite different species: *Amaryllis moreliana* (Lem.) Traub. A color photo received from Mr. Blossfeld confirmed the latter identification.

With reference to *A. vittata* var. *tweediana*, I already expressed my opinion (see Ravenna 1969) that this “variety” should be considered as a synonym of the typical *A. vittata*.

The specimens cited below, from the State of Santa Catarina are probably assignable to *A. moreliana*. Others from Paraná seem doubtful, and therefore could be determined with certainty only after a field work.

Specimens: Brazil, Santa Catarina, mun. Garuva, São Francisco do Sul, 900 m, matinha; leg. Reitz & Klein 9815, 2-IX-1960 (HBR). Mun. Campo Alegre, Morro do Iquererim, 1500 m; leg. Reitz & Klein 5235, 18-X-1957 (HBR).



3. On the inflorescence of *Amaryllis paradisiaca*

In the last series of this work (Ravenna 1981), *Amaryllis paradisiaca* Rav. was described. Due to an unfortunate mistake, probably in typing the manuscript, in the English description was written "inflorescence two-flowered", contradicting the Latin description. *Amaryllis paradisiaca* bears a one-flowered inflorescence.

## III. A NEW HABRANTHUS FROM THE BRAZILIAN MIDDLE-NORTH

In a batch of specimens recently sent to me from the New York Botanical Garden, one *Habranthus* representative proved to be new.

*Habranthus maranensis* Rav., sp. nov.

Species a *Habrantho sylvatico* proxima sed bulbo subglobose cum pseudocollo breve, foliis ad anthesin absentibus, spatha brevior, floribus majoribus colore vario, differt.

Plant up to 22 cm high. Bulb subglobose, ca. 25-28 mm wide; pseudo-neck very short, to 13-15 mm long. Leaves none at anthesis. Scape pale green, to 15-16 cm long. Spathe pale, 20-26 mm long, tubular for 8.5-13 mm, then bifid. Inflorescence one-flowered. Pedicel 25-44 mm long. Ovary obovoid, green, 2-3.5 mm long, 1.8-2.5 mm wide, slightly inclined. Perigone oblique, white, pink or light orange, to 57-65 mm long. Perigone tube narrowly infundibulate, 14-18 mm long. Tepals oblanceolate to 42-48 mm long; the outer 7-8 mm broad, minutely apiculate; the inner 9-10 mm broad, acute. Filaments fascicled, declined, the apex ascending; the lateral episepal pair 14-16 mm long, the upper episepal 18-21 mm long; lower epipetal 22-23 mm long; lateral epipetal pair 22-27 mm long. Anthers reniform-oblong, 2-3 mm long. Style filiform, declined, to 48-51 mm long. Stigma lobes recurved, 1-2 mm long.

Habitat.—Fields nearly 40 km from Caxias, State of Maranhão, Brazil; it grows in sandy soil.

Specimens: Brazil, Maranhão, approx. 40 km from Caxias, on BR-135, near km 512; leg. D.C. Daly et al. D-695, 20-X-1980 (Herb. Ravenna, type; NY et caet., isotypes).

*Habranthus maranensis* appears as related to *H. sylvaticus* (Mart. ex Schult. F.) Herb. It is distinguished by the subglobose bulb, with an almost obsolete pseudoneck, the absence of leaves at anthesis, shorter spathe, and larger flowers, these varying in color from white to pink and pale orange. The same characters separates the species from *H. goianus* Rav.

## IV. REVISIONAL STUDIES IN THE GENUS URCEOLINA

Since MacBride's Flora of Peru, and save the brief treatment of Traub (1971), no revision of the genus *Urceolina* Reichenb., nom. conserv. (including at least *Eucharis*, and *Calliphuria*, as subgenera), has been undertaken. The Peruvian, and Brazilian species, clearly appear as the most

urgently needed for revision.

Traub (loc. cit.), reduced *Calliphuria* (Herb., *Eucharis* Planch., *Plagiolirion* Bak., and *Mathieua* Klotzsch, to subgenera of *Urceolina*. In what concerns the first two genera, his action is accepted (See Ravenna 1978). Some reserves are due, however, concerning *Plagiolirion*, and *Mathieua*.\* The latter inhabits a dry, open wood on the Pacific coast, which represents a rather different habitat, from what is usual in *Urceolina*. In fact, the other subgenera, are found in the rainy forest of the east side of the Andes, shady ravines, or the Amazon lowlands. The genus ranges from Panama to Bolivia.

1. New species from Ecuador, Peru, and Brazil.

In the following lines, and as an advance to a future unified work, new species in the subgenera *Urceolina*, and *Eucharis*, are described.

*Urceolina astrophiala* Rav. sp. nov.  
(subgeneris *Eucharis*)

Species ex pocular staminali a. *U. moana* mihi similis sed habitu et floribus minoribus partis liberis filamentorum perfecte triangulari-cuspidatis recedit.

Plant up to 43 cm high. Bulb not seen. Leaves two; petioles to 24-26 cm long, 4-5 mm broad; blade lanceolate, dark green, ca. 20-23 cm long, 7.5-8 cm broad. Scape cylindrical, to 49 cm long. Spathe herbaceous (marcescent?); outer valve narrowly lanceolate with involute margins, to 37 mm long, the inner lanceolate, ventricose to 22 mm long, 7-8 mm broad; inner bracts broad, lanceolate, subventricose, to 33-20 mm long. Inflorescence several-flowered. Pedicels to 6-9 mm long. Ovary ovate or widely elliptic, whitish, to 3-3.3 mm long, 2-2.5 mm wide. Perigone nodding, white, ca. 42-43 mm across. Perigone-tube whitish, moderately recurved, to 4 mm long. Tepals spreading horizontally or slightly recurved, the outer narrowly lanceolate, to 20-22 mm long, 4.5 mm broad, narrowing gradually toward the apiculate apex, the inner broadly lanceolate, to 22 mm long, 9-10 mm broad, acute. Filaments flat almost to the apex, joined for 7 mm into a cup (greenish?, yellowish?), the free portion deltoid except for a diminutive, filiform segment of the size of the anther lobes; a six-pointed star is therefore configured. Anthers linear-oblong, easily detachable, 5-6 mm long. Style filiform, to 42 mm long (from ovary). Stigma trilobed, each lobe 0.8 mm long.

Habitat.—NE-exposed slopes with rain forest, at 600 m above the sea on the Quevedo-Latacunga road, km 46 from Quevedo (79° 11', 0° 55' S), prov. Cotopaxi, Ecuador.

Specimens: Ecuador, prov. Cotopaxi, Quevedo-Latacunga road, km 46 from Quevedo; leg. Holm-Nielsen et al. 2851, 4-IV-1973 (AAU, type).

*Urceolina astrophiala* appears as scarcely related to any of the known species, unless perhaps to *U. moana* Rav. (see in this work). In this, the staminal cup bear no teeth or lobes, and the free portion of filaments is

\* With reference to *Plagiolirion* and *Mathieua* it should be emphasized that difference in habitat does *not necessarily* require changing the genetic status. For instance, *Amaryllis* grow in various habitats—aquatic, lowlands, highlands, etc.—*Editorial note.*

lanceolate-triangular. The present species is distinguished by the smaller habit, and the peculiar star-shaped staminal cup.

*U. astrophiala* represents the first record of the genus in the Ecuadorean flora.

*Urceolina moana* Rav., sp. nov.  
(subgeneris *Eucharis*)

Species a *U. astrophiala* proxima sed habitu et floribus majoribus filamentis lanceolato-triangularibus (haud triangularibus) differt. A caeteris speciebus a pocula staminali elobata vel edentata distinguo.

Plant up to 60-75 cm high. Bulb subglobose, 25-42 mm in diameter, prolonged for 30-40 cm into a pseudoneck. Leaves about three, long-petioled, sheathing below for 30-40 mm; petioles subtrigonus, 24-36 cm long, 7-13 mm thick; blade lanceolate-elliptic, dark green, 23-37 cm long, 10-15 cm broad, acute. Spathe valves lanceolate, marcescent, 20-28 mm long. Inflorescence 3-8-flowered. Pedicels to 13-23 mm long. Flowers nodding. Ovary ovate to ellipsoid, green, to 6-7 mm long, 3.5 mm wide. Perigone rotaceous, white, to 55 mm across. Perigone tube cylindric, white, 25-29 mm long. Tepals subequal, lanceolate, spreading horizontally, to 30 mm long, 8-9 mm broad, acute. Filaments flat, green-spotted (Acc. coll.), joined below into a 10 mm long cup, the free portion lanceolate-triangular, to 4.5 mm long, 1.9-2 mm broad at the base. Anthers oblong, ca. 5 mm long. Style filiform, exceeding the perigone for 10 mm. Stigma trilobed, the lobes 0.8-0.9 mm long. Fruiting pedicels suberect, to 13-14 mm long. Capsule orange-red, 12-15 mm wide. Seeds few, widely elliptic, black, shiny, to 5 mm long, 3.5-4 mm wide.

Habitat.—Wet forest near Serra da Moa village, Rio Moa region, State of Acre, Brazil.

Specimens: Brazil, State of Acre, Rio Moa, at Serra da Moa village; leg. Prance et al. 12491, 27-IV-1971 (NY, type; Herb. Ravenna, isotype in fruit). Amazonas, mun. Lábrea, trail from W bank of Rio Purus, opposite Lábrea; leg. Prance et al. 8104, 30-X-1968 (NY, INPA, US, K, etc., in fruit) (?).

*Urceolina moana* is separable from the known species of the genus, by virtue of the lanceolate-triangular free portion of filaments, together with the absence of lobes, or teeth, in the cup. In this, it resembles *U. astrophiala* Rav., which, however, bears much smaller flowers, and deltoid free portions of filaments.

The specimen Prance et al. 8104 (in fruit), is assigned here tentatively. The smaller size of the plant suggests that it might be identified with *U. narcissiflora* Huber.

*Urceolina ipariensis* Rav., sp. nov.  
(subgeneris *Eucharis*)

Species a *U. mastersii* proxima sed floribus minoribus, tepalis leviter

dissimilis augustioribus, dentibus poculae staminalis irregularibus et acutioribus distingo.

Plant up to 44 cm high. Bulb subglobose ca. 35-45 mm wide. Leaves two; petioles subtrigonus, to 40 cm long, 7-8 mm broad; blade obovate-elliptic, acute, to 23-29 cm long, 8.5-10 cm broad. Scape to 41 cm long. Spathe-valves lanceolate, subequal, ca. 39 mm long. Inflorescence nearly six-flowered. Pedicels spreading upright, to 11-20 mm long. Ovary ovoid to widely ellipsoid (green?) to 4.5 mm long, 3.5 mm wide. Perigone white, nodding, ca. 4.5-5.5 (-6?) cm across. Perigone tube curved, slightly enlarged at the apex, to 23-28 mm long. Tepals spreading, lanceolate, the outer broader than the inner, to 28-30 mm long, 11-13 mm broad, the inner 28-29 mm long, 9 mm broad. Staminal cup 13-15 mm long, with twelve irregular, cuspidate teeth (two for each filament), these 1.5-3 mm long; free portion of filaments lanceolate-attenuate, 5-5.8 mm long. Anthers versatile, 2-2.2 mm long. Style filiform, to 44 mm long. Stigma capitate-trilobed.

Habitat.—Dry, tropical woods along the Pachitea river, about 20 km above the confluence with the Ucayali, 300-400 m above the sea, in the department of Huánuco, Peru.

Specimens: Peru, Huánuco, prov. Pachitea, dist. Honoria, Bosque Nacional de Iparia, a lo largo del Río Pachitea, cerca del campamento Miel de Abeja (1 km arriba del pueblo de Tuernavista); leg. J. Schunke 1887, 26-IV-1967 (NY, type; F, isotype).

This interesting species appears as related to *Urceolina mastersii* Bak., differing in the smaller flowers, narrower tepals, both series being slightly dissimilar, and by the irregular and more acute teeth of the staminal cup.

*Urceolina ayacucensis* Rav., sp. nov.

(subgeneris *Urceolina*)

A caeteris speciebus subgeneris *Urceolina* tepalis concoloribus et dentibus poculae staminalis abbreviatae triangularibus differt. Inflorescentia circ. 8-flora. Perigonii tubus tubaeformis ad 23-24 mm longus. Filamenta perigonium aequantia.

Plant up to 67 cm high. Bulb ovoid to 55 mm long, 40 mm wide. Leaves about three, to 61-64 cm long; petioles subtrigonus, 31-36 cm long; blade elliptical or ovate-elliptical, to 30-32 cm long, 11-12 cm broad, acute. Scape 57 cm long, almost cylindrical. Spathe-valves marcescent, ca 25 mm long. Inflorescence 8-flowered. Pedicels 55-65 mm long. Ovary ovate or ovate-ellipsoid, to 6.5-7 mm long, 4.5 mm wide. Perigone tube trumpet-shaped, straight, to 23-24 mm long. Tepals lanceolate (yellow?), contiguous, forming a cup, their points apparently not reflexed nor green tinged; the outer to 28 mm long, 6 mm broad, acute; the inner 22 mm long, 8 mm broad. Staminal cup reduced to 6 deltoid teeth, to 1.5 mm long, at the base and between the filaments. Filaments filiform, in two series of 18 and 24 mm long respectively. Anthers versatile, oblong, to 4 mm long before maturity, 1-1.5 mm long after dehiscence; pollen yellow. Style filiform, to 5.4 cm long. Stigma



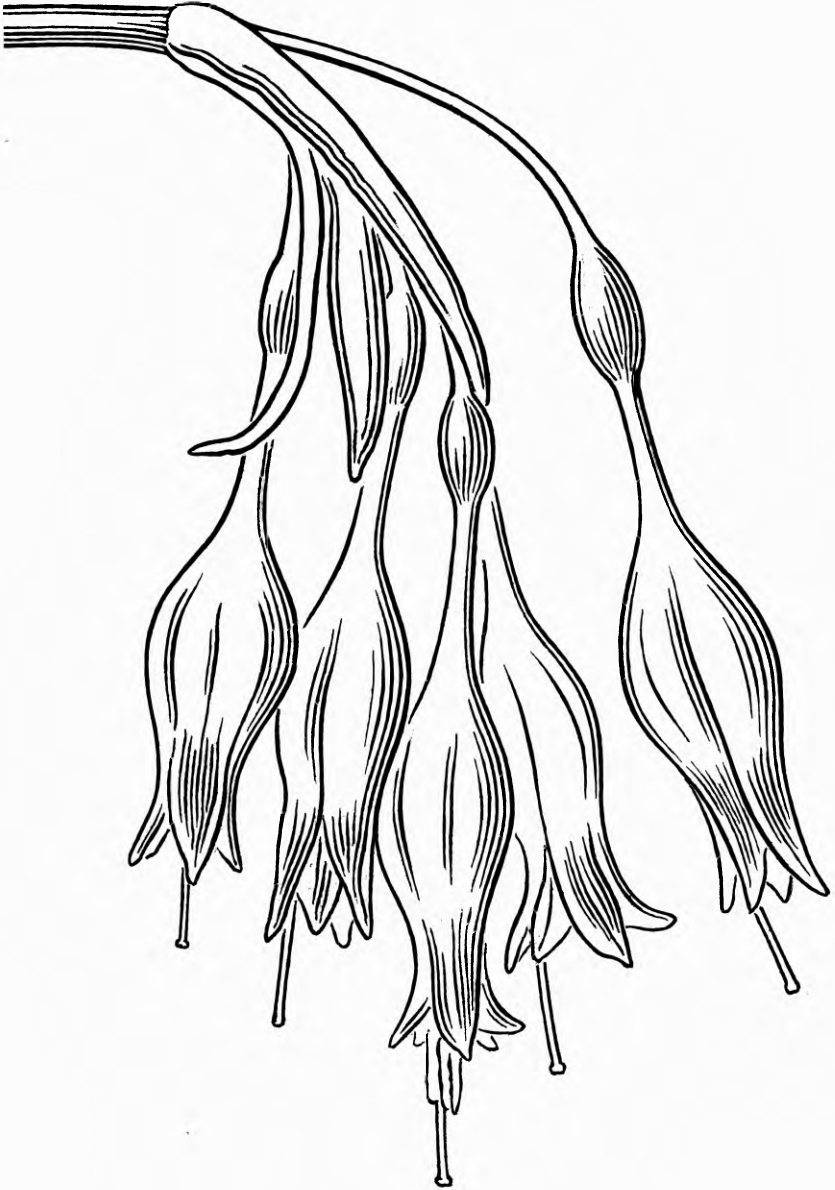


Fig. 16. *Urceolina microcrater* Kraenzl. inflorescence. Drawing by P. Ravenna, after a color print of T. Plowman (at F.).



capitate.

Specimens: Peru, dept. Ayacucho, prov. La Mar, Rio Masamerich, 1500-1700 m; leg. Weberbauer 6652 (F, type).

*Urceolina ayacucensis* is distinguished from the other species of subgenus *Urceolina*, by virtue of the not green-tinged tepals, and the six deltoid teeth between the filaments. These lobes are the only apparent parts of a staminal cup, and in the other species of the subgenus they are smaller and rather obtuse. Although not obvious from the dry specimen, the flowers probably are pendulous on curved pedicels, as in *U. microcrater* Kraenzl., and *U. urceolata* (Ruiz et Pav.) Pax.

## 2. *Urceolina urceolata* and *U. microcrater*

*Urceolina microcrater* was proposed by Kranzlin (1916), upon a Weberbauer collection from the Pozuzo valley, in the department of Huanuco, Peru. This is the "locus classicus" of *Urceolina urceolata* (Ruiz et Pav.) Pax (*Crinum urceolatum* Ruiz et Pav., collected at "Pozuzo et Pampamarca"). Some sheets of *U. microcrater* that I examined, including a clastotype (a single flower), a phototype, and a specimen from near Pampamarca, leaves ground to suspect that some mistake could have been introduced by Ruiz and Pavón, concerning the data of origin of *U. urceolata*.

However, a single scant specimen from Pozuzo (Macbride 4712) revealed to be the genuine *U. urceolata*. It can therefore be concluded that both species overlap their distribution. In order to facilitate identification, a table of contrasting characters (see Table I), and a figure of *U. microcrater* (Fig. 16) are given.

Table 1: Contrasting characters of *Urceolina urceolata* and *U. microcrater*

Character	<i>U. urceolata</i>	<i>U. microcrater</i>
Perigone size	5-6 cm long, 18 mm wide	2.8-3 cm long, 8 mm wide.
Perigone tube	18-20 mm long, cylindrical-filiform.	8-10 mm long, moderately dilated above.
Tepals carriage	Ventricosely connivant, spreading in the upper fourth.	Ventricosely connivant, the upper third or half being rather imbricate-contiguous.

Specimens: *U. urceolata*. Peru, dept. Huánuco, Pozuzo; leg. F. M. Macbride 4712, 20/22-VI-1923 (F).

*U. microcrater*. Idem, valley of Rio Pozuzo; leg. Weberbauer 6741 (F, clastotype). Idem ibid.; leg. Weberbauer 6741 (F, phototype Nr. 9998,

seen). Idem, Rio Huallaga canyon, below Rio Santo Domingo, 1220 m; leg. Macbride 4245, 3-VI-1923 (F). Idem, prov. Leoncio Prado, Quebrada Las Pavas, between Las Palmas and Santa Maria, 720 m; leg. T. Plowman & H. Kennedy 5721, 24-III-1976 (F, color-photo).

### 3. *Urceolina*, recorded in the Bolivian flora

The genus *Urceolina* was known, so far, as inhabiting Panama, Colombia, Peru, and Brazil. The discovery of the new *U. astrophiala* (see in this work), represented a range extension in Ecuador.

Although not formally recorded yet in Bolivia, the presence of *Urceolina* in this country is demonstrated by two specimens, collected in two different localities, and deposited in the New York Botanical Garden. The species might be identified, tentatively, as *Urceolina bakeriana* (N.E. Br.) Traub. The definitive determination will result from the study of living material.

Specimens: Bolivia, Cosendo; leg. G.E. White 930 19-VIII-1921 (NY). Rurrenabaque; leg. M. Cárdenas 1179, 25-V-1921 (NY).

### V. A NEW SPECIES OF PARAMONGAIA FROM BOLIVIA

Up to the present, the genus *Paramongaia* has been considered as monotypic, with *P. weberbauerii* Velarde, as the single species, from two different areas of Peru: one in the coastal vegetation of the department of Lima; the other in the Andean slopes between Casma and Huaráz, in the dept. of Ancash. The discovery of a second species in Bolivia, appear, therefore, as a highly interesting event.

#### *Paramongaia superba* Rav. sp. nov.

Species a *P. weberbauerii* foliis brevioribus et angustioribus nervio medio in facie abaxiale edistincto, flore suberecto, tepalis latioribus differt.

Spatha bivalvis circ. 9-9.7 cm longa valvis usque 44 cm connatis. Ovarium sessile. Perigonium luteum usque 14 cm longum circ. 15 cm latum textura crassa. Perigonii tubus circ. 85 mm longus. Tepala exteriora late oblanceolata ad 8 cm longa circ. 26.5 mm lata apiculate; interiora elliptica ad 78-79 mm longa circ. 37-38 mm lata obtusa. Filamenta subulata inflexa circ. 16.5 mm longa ad 20 mm infra marginem coronae affixa. Antherae versatiles. Stylus circ. 14.6-14.7 cm longus. Stigma infundibulato-capitatus viscosus circ. 5.5 mm latus.

Bulb not seen; pseudoneck ca. 16 cm long. Leaves five at anthesis, ensiform, to 27-37 cm long, 10-20 mm broad without a distinct midrib on the abaxial face. Spathe bivalved to 9-9.7 cm long; the valves lanceolate joined for 44 mm below; inner bract similar to the valves in size and shape. Flower suberect. Ovary sessile, ovate or elliptic, to 15-16 mm long, 7 mm wide. Perigone yellow, to 14 cm long, 15 cm wide. Perigone tube 85 mm long. Outer tepals widely oblanceolate, to 8 cm long, 26.5 mm broad, apiculate;

apicule 3.5 mm long, tubercled below. Inner tepals elliptic, to 7.8-7.9 cm long, 37-38 mm broad, the apex obtuse. Staminal cup yellow to 57 mm long, 55 mm wide at the apex, cut into six, ca. 10 mm long lobes; these divided into two, 5 mm long, repand lobes. Filaments subulate, inflexed, to 16.5 mm long, attached at about 20 mm from the cup edge. Anthers oblong, versatile, yellow, to 14 mm long before dehiscence. Style erect, to 14.6-14.7 mm long. Stigma capitate-infundibular, viscose, 5.5 mm wide.

Specimens: Bolivia, dept. La Paz, prov. Bautista Saavedra, cantón Amarete, valley of the Amarete river; leg. E. Krach 8194, 29-I-1980 (Herb. Ravenna, type; M, isotype).

The species is separable from *P. weberbauerii* on account of the shorter, narrower leaves, the larger spathe, the suberect flower, with broader tepals, longer style, and larger stigma.

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## ALSTROEMERIA X ZEBRINA DUNCAN

*Alstroemeria X Zebrina* Duncan. Hybrida inter *A. brasiliensem* ♀ et *A. pulchellam* (psittacinam) ♂ est; floribus dense tractis pencillatisque colore combinatio proprio roseo-vinaceo, virideque.

A new hybrid, *Alstroemeria* of exotic interest rather than great beauty is *Alstroemeria x zebrina*. It is a cross between *A. brasiliensis* and *pulchella* (*psittacina*), *A. brasiliensis* being the seed parent. It is a heavily streaked and penciled tubular flower of an odd combination of pinky-wine and green.



Fig. 17. *Alstroemeria x zebrina* Duncan - flowers exotic, streaked and penciled; an odd combination of pinky-wine and green.

I was curious to see if these two species which both come from the warmer sections of South America and have several characteristics in common such as similar leaf formation, habit of growth, tubers, and flower forms would cross. They do so with great ease. Although the progeny varies somewhat in color, the most typical is tipped with "lettuce green" 861/1, changes to "rose pink" 427/3 in the center section of the petal and deepens at the base to "erythrite red" 0027/2, as per the colors in Volume II of the *Royal Horticultural Society Colour Charts*.

Under greenhouse conditions *Alstroemeria x zebrina* grows 2 to 3 feet tall (60 to 90 centimeters) and produces a flowering whorl of 4 or 5 stems. The individual flower is approximately 1½ inches (3.75 centimeter) long.

I doubt that this hybrid will be hardy enough to survive outside in western Washington because of the "warm" blood lines in both of the parents. I will however try a plant or two in the open field in the near future and report on the results.—Donald D. Duncan, *Chairman, Alstroemeria Committee, P.O. Box 238, Sumner, Washington 98390.*



## REGISTRATION OF NEW AMARYLLID CLONES

MR. JAMES M. WEINSTOCK, *Registrar*

10331 Independence, Chatsworth, Calif. 91311

This department has been included since 1934 to provide a place for the registration of names of cultivated **Amaryllis** and other amaryllids on an international basis. The procedure is in harmony with the International Code of Botanical Nomenclature (edition publ. 1961) and the International Code of Nomenclature for Cultivated Plants (edition publ. 1958). Catalogs of registered names, as well as unregistered validly published names, will be published from time to time as the need arises. The first one, "**Descriptive Catalog of Hemerocallis Clones, 1893-1948**" by Norton Stuntz and Ballard was published in 1949. Additional catalogs of cultivars have been published since 1949: **Catalog of Brunsvigia Cultivars, 1837-1959**, by Hamilton P. Traub and L. S. Hannibal, PLANT LIFE 16: 36-62. 1960; Addendum. PLANT LIFE 17: 63-64. 1961; **Catalog of Hybrid Nerine Clones, 1882-1958**, by Emma D. Menninger, PLANT LIFE 16: 63-74, 1960; Addendum, PLANT LIFE 17: 61-62, 1961; **The Genus X Crinodonna**, by Hamilton P. Traub, PLANT LIFE 17: 65-74. 1961; **Catalog of Hybrid Amaryllis Cultivars, 1799-1963**, by Hamilton P. Traub, W. R. Ballard, La Forest Morton and E. Authement, PLANT LIFE. Appendix i-ii + 1-42. 1964. Other catalogs of cultivated amaryllids are scheduled for publication in future issues. These may be obtained at \$8.00 pre-paid from: Dr. Thomas W. Whitaker, Executive Secy., The American Plant Life Society, Box 150, La Jolla, Calif. 92038.

The registration activity of the American Plant Life Society was recognized when at the XVIth International Horticultural Congress, Brussels, 1962, the Council of the International Society for Horticultural Science designated the American Plant Life Society as the Official International Registration Authority for the cultivars of **Nerine**; and this was extended to include all the **Amaryllidaceae** cultivars, excepting **Narcissus** and **Hemerocallis**, at the XVIIth International Horticultural Congress, 1966.

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

Correspondence regarding registration of all amaryllids such as **Amaryllis**, **Lycoris**, **Brunsvigia**, **Clivia**, **Crinum**, **Hymenocallis**, and so on, should be sent to Mr. Weinstock at the above address. The registration fee is \$2.00 for each clone to be registered. Make checks payable to American Plant Life Society.

## REGISTRATION OF NEW AMARYLLID CLONES, 1981

## AMARYLLIS CLONES

**Registered by Harry Deleeuw Company (pty) Ltd., P.O. Box 7, Mariasburg 1700, South Africa.**

*Amaryllis* clone 'Candy Floss' (Deleeuw, 1981); A-1047; averages 2.3 stems per bulb and 4.9 flowers per stem. Scape height is 55 cm, flower diameter 18 cm. Color: Carmine rose (cc58c/d). Blooming season is September to December. It is a deciduous hybrid introduced in 1975.

*Amaryllis* clone 'Miracle' (Deleeuw, 1981); A-1048; averages 2.2 stems per bulb and 4.4 flowers per stem. Scape height is 48 cm and the flower diameter is 17 cm. Color: Currant red (cc46c). Blooming season is September to December. It is a deciduous hybrid introduced in 1976.



**Registered by Marcia Wilson, 255 Galveston Road, Brownsville, Texas 78521.**

*Amaryllis* clone 'Encore' (Doran, 1981); A-1049; Scape height is 59 cm, flower diameter is 14 cm. and flower length the same. Flower is white with pale pink streaks, fragrant, and blooms predominantly in early spring. It is evergreen and results from (Orange Mead x Senorita) x *fragrantissima*. Introduced in 1982, this clone has four flowers per umbel, is a vigorous and rapid multiplier, and may be a consistent rebloomer.

**Registered by Charles D. Cothran, 1733 North Gibbs Street, Pomona, CA 91767.**

*Amaryllis* clone 'Sweet Delight' (Cothran, 1981); Scape height is 16 inches, flower size and length both 5½ inches. Flower is fragrant, spring blooming, and red (54B Spinel Red on R. H. S. Colour Chart (HCC 0023/1) of an unusual shade and is borne above luxurious evergreen foliage. This vigorous grower is the result of a cross of (*A. Pardina* x *A. traubii*) x *A. fragrantissima*. Introduced in October, 1981.

(Continued on page 110)

### 3. GENETICS AND BREEDING

#### A TETRAPLOID *AMARYLLIS STARKII*

MARGOT WILLIAMS\*

*Amaryllis starkii* Nelson & Traub is a self-sterile diploid species with a somatic chromosome number of  $2n = 22$  (Nelson and Traub, 1963). It possesses traits which make it of interest to amaryllis breeders: (1) it has glaucous leaves, which in the author's experience are free of the lesions caused by *Stagonospora curtisii* even when the plants are grown in an environment surrounded by amaryllis showing a high incidence of infection, and (2) the plant has upward-facing flowers, a trait which is transmitted in lesser degree to hybrids which have *A. starkii* as one parent. This latter trait is one which gives the flowers a jaunty aspect, and could be quite valuable in hybrid amaryllis grown as garden subjects or cultured in large containers for placement at floor level. Diploid *Amaryllis starkii* does not cross readily with tetraploid hybrids, as is common in amaryllis with most attempts to cross diploids and tetraploids. For this reason, an experiment was initiated in which seedlings of *Amaryllis starkii* were treated with colchicine in an attempt to induce tetraploidy.

#### MATERIALS AND METHODS

Seeds of *Amaryllis starkii* were obtained from J. L. Doran, 1117 N. Beachwood Drive, Burbank, California. The seeds were germinated by floating them in a cup of distilled water. When the seedlings were far enough along so that the differentiation between root and shoot could be discerned by the naked eye (about 3-4 days after germination), the seedlings were treated with colchicine.

Agar-gelled colchicine was prepared by making a 0.05% aqueous solution of colchicine and adding 7g/liter Difco Bacto-Agar\*\*. The solution was heated to dissolve the agar, and 10 ml aliquots were placed in small screw-top bottles. The filled bottles were autoclaved at 15 psi for 20 minutes, and cooled.

Young seedlings were inverted into the colchicine gel and placed so that the seedlings were immersed in the gel to just below the point where the root and shoot differentiated. The roots were not immersed in colchicine since they are more sensitive to the toxic effects of colchicine. The bottles con-

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\*\* Mention of a trademark or proprietary product does not constitute a guarantee or warranty of the product by the U.S. Department of Agriculture and does not imply its approval to the exclusion of other products that may be suitable.

taining the seedlings were then placed upside down to prevent the roots from growing down into the agar, and left for 24 hours. The seedlings were then removed from the gel, rinsed in tap water for 2 hours, and planted in moist sphagnum moss. They were maintained in a mist propagation greenhouse until they had two leaves, at which time they were potted into soil. When sufficiently grown, root tips were collected into water. They were pretreated with 0.2% aqueous colchicine for 4 hours and fixed in 1:3 acetic acid:ethanol. Squashes were made using the acetocarmine smear technique. Photomicrographs were taken where spreads were flat enough for a clear focus in one plane.

### RESULTS

Five seedlings germinated and were treated with colchicine. Two survived the colchicine treatment. Gross morphology suggested that one seedling was a normal diploid while the other was polyploid, which was verified by examination of their root tips. The polyploid seedling was tetraploid, and a root tip cell is shown in Fig. A.

While the seedlings have not yet reached flowering size, there are significant differences between them. The tetraploid is much more vigorous and is about three times as large as the diploid, although the number of leaves is the same. Leaves of the tetraploid are thicker and darker green than those of the diploid.

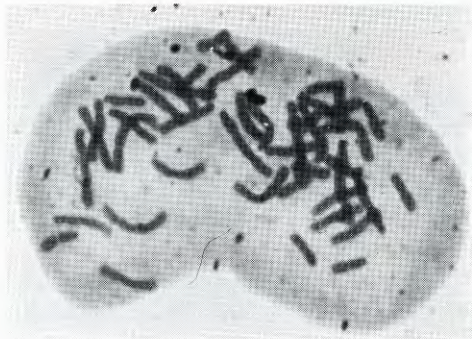


Fig. 18. Root tip cell of colchicine-induced tetraploid *Amaryllis starkii* at metaphase, showing  $4n = 44$  chromosomes.

### DISCUSSION

The induced tetraploid will undoubtedly be useful in breeding work, but may have broader implications for students of *Amaryllis*. Diploid *A. starkii* is self-sterile. If the tetraploid proves to be self-fertile it will increase our knowledge of the mechanism of self-sterility in diploid amaryllis, and may aid in the understanding of evolution of *Amaryllis* species.

## REFERENCE

Nelson, I. S. and H. P. Traub. 1963. *Amaryllis starkii* sp. nov. *Plant Life* 19:37-40.

## THE CONTINUING PURSUIT OF YELLOW

by C. D. COTHRAN,

1733 N. Gibbs St., Ponomo, CA 91767

'Yellow Pioneer' bloomed again this year from a larger bulb, putting up two scapes at almost the same time, and blooming three flowers on each scape at almost the same time. This made quite a show, the flowers being just about seven inches in diameter, and a good chartreuse color. Ample quantities of pollen were collected and several crosses were made, some quite far out (i.e. 'Yellow Pioneer' x Double Beauty) as few yellow flowers were in bloom at this time. It often happens that the plant one wants for the seed parent blooms much ahead of the one selected for the pollen parent.

In March of 1973 a cross was made with *A. evansiae* and borrowed pollen of *A. papilio*. In time two plants bloomed, very similar to each other. The blooms were about six inches in diameter, flat and quite regular in form. The ground color was yellow with dark red veining more prominent than the yellow. The yellow that was visible was quite a strong yellow, so in 1978 one of the flowers was pollinated with pollen from 'Yellow Pioneer.' Seed developed, and in March of this year one of the plants bloomed from a crowded colony pot of the seedlings. It had three six inch flowers on a scape fourteen inches tall; the flowers being nicely formed, with wide segs heavily imbricated. No *A. papilio* color or form was evident. The color was compared with The Royal Horticultural Colour Chart and found to be 4C (Primrose Yellow HCC 601-2) which is the yellowest *Amaryllis* bloom I have had to date. The weather was cool and the flowers lasted well, and in about eight days all of the flowers developed a pale pink blush. Crosses were made with pollen from 'Yellow Pioneer', and reverse crosses with two 'Yellow Pioneer' siblings. The siblings set seed but the other plant did not.

The crosses of 'Yellow Pioneer' on itself improved this year with its second blooming. It was not more yellow, but it was larger and better formed, and its three six inch flowers bloomed almost at the same time. Several crosses were made with this flower but not with any real inspiration.

A cross made several years ago with pollen from 'Yellow Pioneer' and a plant from the #339 parent series which had some attractive qualities. This cross bloomed this Spring, and while the color was not improved over 'Yellow Pioneer', it was about as good, and the scape had *four flowers* of nice size and substance, and since the #591 series has been lacking plants with four flowers, this can be regarded as a step forward. This plant and the one with primrose yellow flowers mentioned earlier might produce some interesting flowers.

It should be noted that a few of the plants of the #591 series have been slow to bloom, taking a full five years to produce their first scape. 'Yellow Pioneer' bloomed in just over a year and a half, and some of the seed produced from its first bloom produced flowers a year before these slow blooming siblings did. These slow to bloom #591 plants did not have very good flowers, but the segs were inclined to be thick, somewhat ribbed, and with a yellow color as good as any of the others. A thicker seg would be an advantage, so a few of these were crossed with their more precocious siblings to see what this would produce.

Some crosses were made a couple of years ago to try to get some large, dark red doubles. 'Queen of Night', 'Nostalgia', 'Violetta', and some of my own red hybrids were used as seed parents, and 'Double Beauty' as the pollen parent. Some of these crosses bloomed this year and quite a few were double, and red. Doubles seem to require two or three years to reach their best, so the true characteristics of these will be evident in a year or two more. Two small red doubles were developed using pollen from *A. belladonna flore plena*. These had four extra segs with the extra segs lying flat against the others. The flowers are about four and a half inches in diameter, nicely formed, and a glowing red.

A white double of medium size resulted from a cross of a white sibling of 'Double Beauty' with 'Double Beauty' pollen. It has bloomed two years now, so it probably will not get larger, but it is a very lovely flower.

One of the best doubles is a glowing pink which bloomed last year, but really came on this year. It only has two flowers to the scape but they exceed ten inches in diameter, and each flower has eighteen segs arranged in a very pleasing way. The scape is eighteen inches tall, and very sturdy.

Quite a few crosses were made using *A. nelsonii* or *A. cybister*, or combinations of the two. A cross was made of (*A. evansiae* x *A. cybister*) x *A. nelsonii* (called "Bell's Hybrid" as he made it first). Dr. Bell says that it is a vigorous grower with rather large Cybister type blooms, with red in the center, and each seg tipped with red at its end. It is going to be hard to wait for this one.

The two seedling *A. fragrantissima* plants that I have did not bloom this year, so no new crosses were made in this area. However, two *A. fragrantissima* crosses did bloom that had not bloomed before. One was from seeds that Len Doran gave me, and it has taken a long time to bloom, and we have both forgotten what the cross was. It is probably *A. vittata* (tweediana) x *A. fragrantissima*. It was lovely, a large fragrant trumpet shaped flower with some red markings. The plant is very robust, and a good grower.

The second cross is a fragrant, trumpet shaped flower, but it is much smaller than the flower mentioned above. It is about three and a half inches across the face, and five and a half inches long. The end of the segs as they bell into a trumpet shape are colored bright red. It is extremely attractive, and the plant is vigorous. It comes from the cross (*A. pardina* x *A. traubii*) x *A. fragrantissima*.



Hybridizing to obtain yellow flowers, doubles, and fragrant flowers has proved so interesting that I have completely saturated my facilities. I have no more room! Until these plants bloom and are thinned by selection there is no more space for plants. I have sent out to others quite a few plants, and a large amount of seed. From the many letters I have received I know that there are a lot of people doing hybridizing, so I hope they will continue while I sit out the next year or two.

## AMARYLLIS BREEDING IN AUSTRALIA

WARREN J. GLOVER, 33 Francis St. Earlwood

NSW 2206, Australia

My initial interest in *Amaryllis* was aroused when I saw a spectacular flower in my garden more than 20 years ago. The bulb, an untraceable gift that had lain on top of the ground and forgotten, had become partially buried beneath the fallen leaves of an old peach tree. The size and shape of the flower was impressive.

The availability here of new material for *Amaryllis* enthusiasts is limited still to the Dutch types. And up to recently my own collection reflected this state of affairs. I developed many hybrids of my own but they were produced without a clearly defined goal except that I concentrated on color, a deep red onto a deep red to get a more permanent or deeper red, cyclamen to cyclamen, pink to pink. Without understanding why I produced more empty pods than full ones, some pods as big as golf balls, some flowers of breath-taking color and size.

My *Amaryllis* species collection is as representative as space and cost will allow and I am now able to embark on a hybridizing program starting this spring (September '81). The crosses made to date are:

A81-1 A. "TOSTO" x A. (*traubii* f. d. x *doraniae*); A81-2 Reverse of the first; A81-3 A. (EAE) x A. \*1525; A18-4 Reverse of the third; A81-5 A. *doraniae* x A. "WHITE WITCH"; A81-6 Reverse of the fifth; A81-7 A. *neopardina* x A. *doraniae*; A81-8 A. (115/1 x 124) x A. *bella-donna* semi plena; A81-9 A. (115/1 x 124) x A. "MILADY"; A81-10 Reverse of the preceding.

A note of explanation on some of these plants is necessary. Hybrids "TOSTO" and "MILADY" are Dutch types purchased from a nursery in Victoria which has strong Dutch connections. I also have their "RILONA", "MONT BLANC", "INTOKAZI" and "REMBRANDT". The clone "WHITE WITCH" is one of the best whites I've seen. I have a number of different clones, all raised from seeds, and all seem to be self and inter-clonally sterile. All but one of the seedlings that have flowered are whites of varying quality. The "black sheep" of the family is a dark blood

red. The plant designated by the cumbersome A. (115/1 x 124) is a hybrid of mine flowering for the first time. The 115 is a very intensely colored cyclamen mono and the 124 a brilliant scarlet mono.

Adapting *Amaryllis* to Australian conditions has been a considerable challenge as my collection includes rain-forest habitat through to desert habitat species. Most are either solitary bulbs or one to two year seedlings. The mature flowering bulbs are well protected outside by brick walls and a cement floor, receiving uninterrupted sun for about half the day. Minimum temperatures of about 40°F. were experienced last winter. Maximum temperatures to around 90°F. can be expected this summer.

Many hardened-off species seedlings are kept on a specially built seedling bench protected at both ends and with an adjustable impervious shade roof but open at the front and from below. Other species are being kept in a cold glass-house. Each environment seems to be successful but once I have cleared the glass-house of unwanted plants all species will reside there.

Our small laundry has been adapted to a seed sowing and baby plant laboratory and nursery. Except for windows it is entirely brick walls and has the least variation in seasonal and diurnal temperature ranges of anywhere in our house. It faces north and gets maximum sun. Seeds are water-floated in jars on shelves around the walls. Our washing machine is my work-bench where I decant seedlings, weigh the CLF formulae etc.

My principal aims in hybridizing *Amaryllis* are (a) improving upon the purity of color in monochrome flowers, especially the whites, while adding fragrance if possible: (b) developing a *pure yellow* using a variation on C. D. Cothran's outstanding work. Mr. Cothran's generosity with seed has provided the basis for my own program. In several years of searching I have gathered some good clones of white flowered hybrids, "Mont Blanc", "White Witch", "White Christmas", "Wedding Bells", and "Bianca", the last of which I have never induced to flower. Marcia Wilson is sending "Maria Goretti" shortly. When I can induce any or all of these whites to interbreed I would welcome the opportunity of communicating and exchanging seed with others with the aim of developing a pure, stable white *Amaryllis*.

On the subject of exchange of live plant material a reference to our quarantine laws would be pertinent at this point. In the case of bulbous plants our "Q" likes to keep them for one growing season. As a general rule visual symptoms of incurable disease such as virus induced mosaic will condemn a plant, curable or reversible symptoms will be treated. The men in charge of our quarantine station in Sydney are highly skilled and enthusiastic plantmen who will make great efforts to minimize the importer's risk and ease the frustrations imposed by our strict quarantine laws. Exporters to Australia are asked to use packing such as peat moss, sphagnum moss or preferably an inert material such as expanded mica or similar. The use of straw or wood shavings/sawdust may condemn a whole shipment. If plants have been chemically pretreated, a statement of such treatment should be

sent with the plants. This is a request only and imposes no obligation on the shipper. All other responsibilities concerning the entry of the plants are borne by the receiver and are easily taken care of. Previous complaints about restrictions caused by "Q" were caused I think by ignorance. The laws are essential to exclude exotic diseases, to protect the vital agricultural industry of this country and to protect the importer's own plants. Minimum charges set by "Q" make it desirable to set a lower limit of about \$50 per shipment.

My collection of *Amaryllis* species is still very young and only just starting to adapt and flower. It could not support even a modest seed exchange program for several seasons so I am still, shall we say, a nett collector. Nothing will make me happier when in the foreseeable future I can distribute and exchange at every opportunity.

Per medium of my maiden report to AYB I take this opportunity of extolling the generosity, patience and kindness of J. L. Doran, Marcia Clint Wilson and C. D. Cothran.

As a final note William Morris of Kotara NSW has given me a miniature *Clivia* which has never flowered. It is about one third the size of *C. nobilis*, the species it most closely resembles. It has a definite pseudostem, leaves are very stiff and slightly falcate. Can anyone help with information?

## DOUBLE AMARYLLIS — SUMMER 1981

JOHN WADE DEME, Rt. 5, Box 236,  
Kinston, North Carolina 28501

The longer I work with double *Amaryllis*, the more strict I become regarding which to discard and which to keep. In the past, I looked for form and the hose-on-hose petal arrangement in deciding on culls. I am still concerned with petal arrangement but I am now interested in ability to stay double during hot weather.

During the heat of summer, the best doubles go semi-double, single, or the petals get very deformed. They will even bear male and female parts. If these will seed (and I don't know if they will), they may pass on the lack of doubleness in the summer.



Several of my original doubles possess the characteristic of staying fully double during summer heat, in the greenhouse or outside. These plants are the ones I have been using in my crosses. Some of the seedlings have been blooming fully double from these crosses. I hope that after another year, I will know whether they will be worth propagating. The characteristic of producing offsets freely continues in all the crosses.

I have approximately 100 new seedlings that should start blooming this fall and winter.

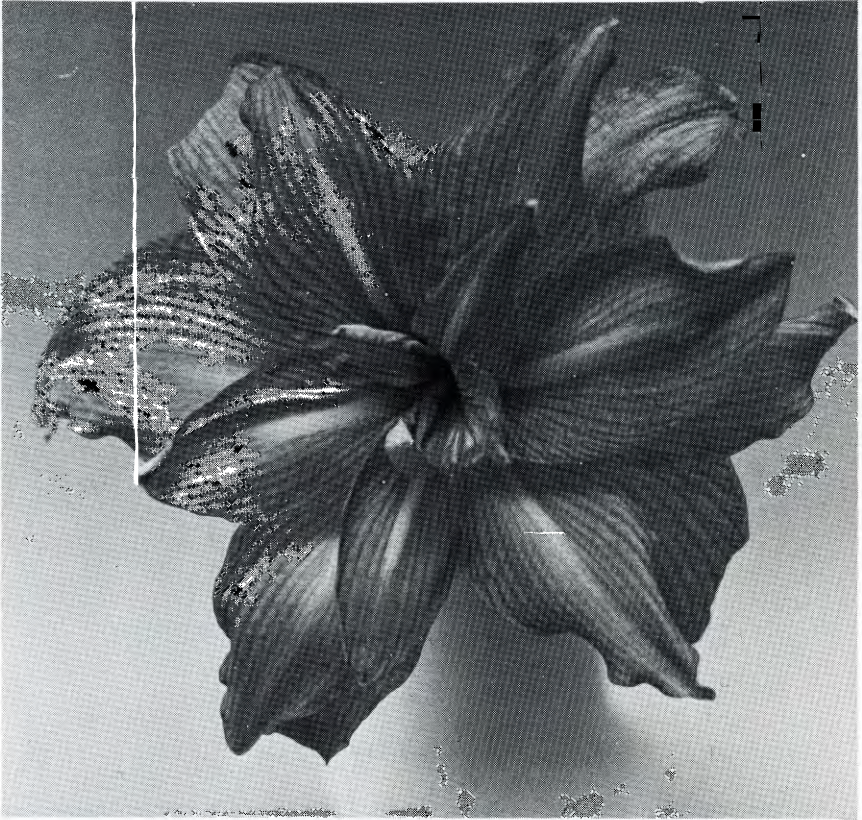


Fig. 19. Double, light orange pink *Amaryllis* seedling, which flowers fully double in the summer heat. Produced by John Wade Deme.

The flower shown in Fig. 19, is unnamed, fully double, fully double, from a plant blooming in August 1981. It has 19 tepalsegs, and is 6 inches in diameter. So far the plant is totally sterile, lacking even the slightest trace of pollen. The color is light orange-pink, and is the type of flower I am looking for.



## POLLEN STORAGE

MRS. MARCIA C. WILSON, 255 Galveston Road,  
Brownsville, Texas 78521

As far as I know, no specific scientific studies have been made with storage of amaryllid pollen. Sophisticated methods have been developed for commercial freezing or storage of various pollens, but the average hobbyist is primarily concerned with safe storage of pollen for one season of bloom. Whether you are interested in saving pollen of *Crinum*, *Zephyranthes*, *Amaryllis*, *Hymenocallis*, etc., the methods for short-term storage are the same.

1. Clip the pollen sac (anther) where it joins the filament. Allow to drop directly into an empty gelatin capsule or a small glassine envelope. If the anthers are collected upon opening of the flower, the pollen is generally immature. Place open capsule or envelope in a safe place until pollen is mature; i.e., anther shrinks and becomes powdery. Pollen generally matures or dries overnight in air conditioned or heated home. Close capsule or envelope only when thoroughly dry.

2. Identify each capsule with brief code for species or hybrid or drop capsule in a small marked coin envelope or similar. Glassine envelopes may be marked prior to collection of anthers. Date each collection. If pollen is to be shared by mail, collect pollen in 2-3 or more containers. For mailing and general use I prefer the small glassine envelopes. While coin envelopes may be purchased or ordered from a stationery or office supplier, you may have to obtain a supply of glassine envelopes from a stamp dealer. Empty gelatin capsules may be purchased from a drugstore or natural food store.

3. Prior to beginning of each flowering season, save several clean glass jars with tight fitting screw lids. The jars should be large enough to hold a number of envelopes, yet small enough to conveniently fit in the refrigerator door shelves. You may wish to have one jar for pollen frequently used and another jar for longer storage. In this case, prepare two envelopes when pollen is collected.

## DRYING AGENTS

For pollen to be used within 1-3 months, no special drying agent is generally required. For storage of 3-6 months, several agents are available. Place ½ to 1" of *powdered milk* from an unopened carton in the bottom of storage jar. Cover with crumpled foil or similar to separate from items being stored. Good for one season only. *Silica gel* may be obtained from a hobby shop or ordered through a horticultural supply house. (*Flower Dri* is one product trade name). A depth of ½ to 1" should be adequate, depending on size of jar. Silica gel normally has a color code when maximum moisture is absorbed. This may be redried in the oven at a low temperature.

Check directions on package. Cover silica gel with foil as above. Small cartridges are manufactured to keep certain chemicals dry. These probably contain silica gel or similar and may be available through a local drug store.

For best chances of preserving viable pollen for six months to a year or more, freezing should be employed. Use an air tight container with drying agent. You may wish to use special tubes with caps in place of gelatin capsules. For finer points of freezing pollen, check with your County Agent or local high school or college biology department.

When using stored pollen of questionable age, apply *generously* to receptive stigma (not only ascending, but hopefully sticky). Handy applicators are a small camel hair water color brush or pencil eraser that has been cleaned by friction on clean cloth.

## DEVELOPING A HOMOZYGOUS PURE BREEDING AMARYLLIS POOL

IVAN J. KENNY, 11542 Kagel Canyon Street,  
Lake View Terrace, CA 91342 (213) 896-6273

I am 70, retired, and have 50 years of horticultural experience, but have grown *Amaryllis* for one year only. I hope to introduce pastel colors, yellow, lilac, and chartreuse into the Dutch hybrids by interspecific crossing. I also want to work toward field hardiness in the Southern states, and to breed for disease resistance.

I worked my way through college by helping to breed tomatoes resistant to spotted wilt virus, watermelons resistant to *Fusarium neivium*, cantaloupes resistant to Powdery Mildew, onions resistant to *Phomas terrestis* (Pink Root), snapdragons resistant to rust, etc.

Some of the top plant breeders in the United States carried on this work. Dr. S. L. Emsweller was breeding the rust resistant snapdragons, and Dr. H. A. Jones, Pink Root resistant onions. Most projects were successfully completed within 10 years.

The *modus operandi* never varied. Inbreed commercial cultivars to attain homozygosity of desired characters, and weed out undesirable ones, especially those with sterility factors and lethal recessives, cross with disease resistant species, backcross to commercial inbred lines for desirable horticultural characters and quality while retaining disease resistance.

Genetics is a numbers game based on statistics. The greater the number of gene pairs that are heterozygous affecting the desired character the smaller the odds of attaining the breeding goal by logarithmic progression. The amount of outcrossing decreases the odds for finding the desired hybrid in logarithmic progression for each outcross.

Trained geneticists call the amateur plant breeders who continuously outcross [Cv.(A) X Cv.(B) X Cv.(C) X Cv.(D)], "Pollen Daubers." Luther

Burbank, without knowledge of Mendelian inheritance, working with large populations, achieved some remarkable results as a "Pollen Dauber." Because of limited propagating space, growing space, and time, the amateur cannot hope to duplicate Burbank's achievements.

For example, in the case of qualitative monogenetic complete dominance that segregates into readily distinguishable groups by self pollination, the heterozygote obtained would consist of 3 dominant types and 1 recessive; of the 3, only 1 is homozygous or true breeding. Two dominant types are heterozygous carrying a recessive allele in each gene pair. So if the amateur selects for breeding one of the heterozygous dominant plants that are indistinguishable from the homozygous ones, the recessive character will eventually show up in outcrossing. It is uncontrolled and its appearance in offspring may be unexpected and undesired.

Where there are 2 heterozygous gene pairs affecting a character, segregation by inbreeding becomes more complicated giving a 9:3:3:1 ratio of phenotypes in the progeny. Only one of the 9 plants is completely dominant for both gene pairs. Only by inbreeding and making many selections to determine which breeds true, can we find the desired plant. Only 1 of the 16 phenotypic segregates is a true breeder, recessive for both alleles. With each new gene pair affecting a character, the desired goal obtained by continuous outcrossing decreases in logarithmic progression.

This situation occurs only in simple qualitative inheritance where the progeny segregates into distinct, readily recognizable groups. In quantitative inheritance, many gene alleles are interacting to produce a character; some may completely inhibit, and others may intensify or modify it. Normally there are no distinct groups and the progeny may grade continuously from one end of the spectrum to the other. Continuous outcrossing in this situation would require such large progenies to uncover the desired segregate that it would be a prohibitive undertaking for the amateur with limited space.

The only way to conquer this statistical numbers game is by inbreeding and thus making all desirable characters homozygous, with all gene alleles either dominant or recessive and with no heterozygous gene pairs. At the same time, all undesirable segregates are discarded, especially the recessive lethals and those that are sterile. This procedure takes a minimum of 3 generations for diploids and 6 generations for tetraploids where only 1 or 2 gene pairs are involved.

Inbreeding introduces an additional problem. The greater the number of recessive gene alleles in an inbred line, the greater is its loss of vigor, since the dominant or wild state alleles are the most vigorous. The recessive characters have all mutated from the wild (dominant) type in plant evolution. The loss of vigor in the inbred lines used to produce hybrid corn is so great that the plants are only waist high and the ears and grains so small that special harvesting equipment is required.

This difficulty is overcome by selecting only the most vigorous seed-

lings each year and by crossing with other inbred lines until the right combination is found that gives the maximum number of dominant gene alleles on all chromosomes in the  $F_1$  cross most nearly approximating the wild state. When the right combination of inbred lines is found, a hybrid is obtained with vigor equal to or often greater than that of either parent.

Mr. John Cage, in "Plant Life" 1975, pages 65-66, states that 2 of his inbred *Amaryllis* lines with flowers 7 inches in diameter often gave  $F_1$  hybrids with flowers 9 inches in diameter. Every plant is identical in the  $F_1$  progeny, the same as in clonal propagation. By inbreeding, and then finding 2 inbred lines that between them give the maximum number of dominant gene alleles on all chromosome pairs, we achieve 100% control of all factors. Hybrid vigor eliminates all undesirable characters including lethal recessives and those that cause sterility. It also eliminates the danger of any masked recessives appearing in subsequent progenies. Thus a gene pool of desirable characters is created in our inbred lines which will give 100% predictable results in the  $F_1$  when selected inbreds are crossed. Where sterility is encountered, we may be forced to make sibling crosses or backcross to one or the other inbred parent in lieu of selfing, but the end results will be virtually the same.

Contrast this with continuous outcrossing done by most *Amaryllis* amateur breeders where the inheritance of not a single character can be predicted, much less controlled, and the chances of producing a desirable hybrid are on the order of 1 in 10,000 or 1 in 1,000,000 depending on the number of genes involved. The genotypic segregates may be predicted by expanding the binomial  $(x + y)^N$  where  $x$  and  $y$  are a heterozygous gene pairs and  $N$  the number of gene pairs affecting the desired character. For this reason I feel that all readers of "Plant Life" who are interested in breeding *Amaryllis* should join a group and exchange inbred seeds of all Dutch hybrids and seed of *Amaryllis* species.

With 20 members in such a pool, by exchanging inbred seed with all members so that each had inbred seed of all cultivars owned by members of the group, then each would have a gene pool of the best characters in the Dutch hybrids. It should then be possible to reproduce any desired characters by controlled crossing of the inbred lines that contained them.

By exchanging seeds of species it should be possible to introduce hardiness, extend the color range, breed for resistance to mosaic and *Stagnospora curtisii*, select seedlings best adapted to a specific area, etc.

Each member could accomplish twenty times as much as working alone, and reduce his own effort by that amount. No member would lose the results of a lifetime of effort as did Mr. John Cage. In a few generations of controlled inbreeding the club should have controlled  $F_1$  hybrids with more vigor, controlled flower size, and shape, and color that would surpass anything now on the market. By using species and selecting for field hardiness and resistance to mosaic and *Stagnospora curtisii*, it should be possible to extend the popularity of *Amaryllis* in the United States.



To obtain resistance to disease, we could artificially inoculate a flat consisting of a row of each inbred seedling line concurrently with our inbreeding and before homozygosity had been reached.

*Stagnospora* infected scales and roots can be mascerated in a blender and a water suspension made to spray the test flats after abrading the mosaic-infected *Amaryllis Cucurbita*, tobacco, and tomato infected with spotted wilt virus, *Gomphrena globosa*, *Chenopodium quinoa* or other *Amaryllis mosaic* host plants (determined by calling the Agricultural Commissioner's office) can be mashed up making a water suspension and sprayed on other test flats where the *Amaryllis* seedling leaves have been abraded with a soft wire brush. Seedlings showing no symptoms can be resprayed to assure that none have escaped infection. Those plants showing no disease symptoms can be inbred and artificial inoculation repeated until resistance or immunity is reached. Resistance might only be found in *Amaryllis* species, but a sample of all Dutch inbred lines should be tested during inbreeding.

I have found to *Amaryllis* bulbs purchased from dealers free of *Stagnospora curtisii*. I have purchased bulbs showing mosaic; they were immediately discarded.

I have approximately 35 Dutch hybrid cultivars and approximately 100 bulbs. I shall self-pollinate all of them and exchange with any *Amaryllis* grower 100 plump candled seeds for inbred seed of Dutch clones that I do not have, in order to increase my gene pool of the Dutch hybrids. Anyone interested can write me for my cultivar list.

I should like to increase my species collection, but have only seedlings planted in September of 1981 contributed by a "Plant Life" member. I have endeavored to double with colchicine the chromosome count of a small number of plants of each species. I did this to increase fertility and to cross directly with tetraploid Dutch hybrids without obtaining a triploid F<sub>1</sub>. I hope to increase the Dutch hybrid color range, increase the blooming season, obtain field hardiness, resistance to disease, fragrance, and a strain with leaves and flowers at the same time.

I would appreciate letters from anyone growing *Amaryllis* who might want to join a group to establish an inbred gene pool for the purpose outlined above.

## AMARYLLIS HYBRIDS

PRAKASH NARAIN,

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*Amaryllis* form an excellent group of the lilies. The individual flower is large, showy and has various forms and colours. *Amaryllis* when grown in pots, decorate the verandah and have long lasting beautiful cut flowers which also serve as an excellent subject for ikabana and other indoor purposes. There are hardly any other lilies which may compete and surpass the beauty of their very handsome blooms.

*Amaryllis* usually flower from mid February to April and May, a period when there is actual scarcity of flowers in the north Indian plains.

There are many recognized centers in America and the European countries, notably, Holland etc., where a large number of new hybrids have been developed.

*Amaryllis* have also been an old favourite in the Indian horticulture. Nearly 375 *Amaryllis* clones have been recorded, so far (Percy Lancaster, 1958). Unfortunately, the records of these studies remain unpublished which has resulted in confusion regarding their ancestry. Different names were coined bearing the same colour, size and form of the flower and vice versa. S. Percy Lancaster (1868-1973) had raised several hybrids and collected many worthwhile hybrids from all over India. At present, a collection of nearly 60 typical *Amaryllis* hybrids have been maintained at NBRI, Lucknow. Though the majority of them are old fashioned and have small to medium sized flowers but they vary in colour, shapes and form. These clones lack an adequate record for their ancestry.

In this work, a program, primarily to produce Indian *Amaryllis* hybrids has been initiated. With this in view, hybrids have been evaluated for their horticultural and botanical characteristics. A few are described here.

*The Amaryllis flower:* The flower is usually borne in an umbel on the flowering scapes emerging from the bulbs. The flower is composed of both reproductive and accessory organs. The accessory organs (sepals and petals) are showy and form a perigone which is collectively known as tepals and tepal tube. The six tepals may be equal or vary in size. If unequal, four size groups may be differentiated. The uppermost sepal, is the larger of the two and known as lip tepal. The sepals as a rule, are larger than the petals. The lower most petal is smaller than the two. The flower (perigone) is bilaterally asymmetrical, compressed, regular and compact or loosely aestivated.

In a few *Amaryllis* hybrids there are lobes near the base of the segs, these are known as tepaloids. The lower portion of the tepalsegs form a tube-like structure lengthwise at the base. This is known as tepaltube. This is an important characteristic of an *Amaryllis* flower and varies from species to species viz. the tepaltube is relatively longer in *A. solandsiflora*, and intermediate in *A. belladonna* and quite-short in *A. leopoldii*.

*Amaryllis* flowers sometimes also have an appendage (corona) situated at the base between the stamens and tepalsegs. This is known as paraperigone; meaning perigone plus. The paraperigone when present varies considerably from bristles, scales, membranous rim to an incurved condition, almost closing throat of the tepaltube.

#### 'GORGEOUS'

*Distinguishing features:* Flowers of this clone appear by the middle of March. The individual flower is 13.0 cm across, open faced, belladonna type and bicoloured being orient red (819) and white. There were also 6-8 self coloured and well developed streaks, densely ribbed at the middle of perigone (Fig. 20). *Tepaltube* 2.5 cm. wide, *Paraperigone* - absent, *Eye* present, 10 cm. wide. This is a seed setting clone.

*Botanical characteristics:* *Plant* evergreen, *leaves* 4-5 in number, size 50.0 cm x 4.0 cm, green, *scape* 50.0 cm tall, green, 2 in a season. *Umbel*, 3-4 flowered. *Pedice*l 4.5 cm long, straight. *Flower* slightly fragrant, bicoloured orient red (819) and white with self coloured streaks spreading from centre to upward. *Perigone* regular, 13.0 cm across and 12.0 cm long, tips pointed. *Tepalsegs* ovate, all equal. *Liptepal* 10.0 cm x 4.5 cm. *Eye* present, 1.0 cm wide, *Paraperigone* absent. *Stamens* 10.0 cm. long, equal to perigone and shorter to the styles. *Anthers* 1.5 cm long, yellowish green, *style* 12.0 cm long, smaller than the perigone and remains within the perigone, *Stigama* trifid, lobed, lobes equal and 0.4 cm long.

#### 'CHARM'

*Distinguishing features:* This is an early flowering clone. Flowers appear up to middle of February. The individual flower is 18.0 cm. across, open faced, belladonna type and bicoloured being crimson (17) and white with a well marked yellowish green throat (Fig. 21). *Tepal tube* 2.0 cm long, *Paraperigone* present but inconspicuous. *Eye*-present, 1.0 cm long. This is a seed setting clone.





Fig. 20. *Amaryllis* hybrid clone - 'Gorgeous'.



Fig. 21. *Amaryllis* hybrid clone - 'Charm'.



*Botanical characteristics:* Plant evergreen. Leaves, 4-5 in number, green above and purplish at the base, size 55.0 cm x 50 cm. Scape 60.0 cm. tall, coloured as leaves, 2 in a season, appearing after an interval of 7-10 days. Umbel 4-flowered. Pedicel 6.0 cm long, straight. Flower moderately open, large 18.0 cm. across and bicoloured being crimson (17) and white with a marked green throat up to the center of perigone. Perigone, regular, compact and open faced, 18.0 cm. x 8.0 cm. Tips recurved. Paraperigone present but inconspicuous. Tepalsegs, ovate, Liptepal 13.0 x 4.5 cm., above half coloured below yellowish green with a marked eye (10 cm wide) at the base. Stamen 11.0 cm long, almost equal to style, recurved. Anther 2.0 cm long and purplish yellow. Style 12.0 cm long, 3 lobed, lobes equal and spreading, recurved (0.4 cm apart).

'APOLLO'

*Distinguishing features:* This is an early flowering clone. Flowers appear from early to mid February. Flowers comparatively small, 15.0 cm. across, belladonna type and bicoloured being signal red (719) and white. All tepalsegs are almost equal and lanceolate (Fig. 22). Tepaltube 2.0 cm long, Paraperigone present, Eye - present, 0.4 cm. wide. This is a sterile clone.

*Botanical characteristics:* Plant evergreen. Leaves 4-5 number, size 74.0 cm. x 5.0 cm., yellowish green. Scape 55.0 cm tall, purplish and 2-3 in. a season. Umbel 4 flowered, Pedicel 4.5 cm., straight or slightly drooping. Flowers 16.0 cm. across, bell-shaped and bicoloured being signal red (719) and white with a marked yellowish green throat. There were also 3-4 very fine streaks like ribs at the middle of the perigone. Perigone, regular, bell shaped, 16.0 cm. wide, open with narrow pointed and little recurved tips. Tepal tube 2.0 cm. long. Paraperigone present, bristle; Tepalsegs, all equal and lanceolate. Liptepal 12.5 cm. x 5.0 cm., narrowing towards tip. Eye -present, 0.5 cm. wide, stamen 8.0 cm. long, smaller to perigone and styles. Anther 1.8 cm. long, light purplish Styles 8.0 cm. long, smaller to perigone. Stigma 3 lobed, lobes equal (0.8 cm. wide) pinkish and recurved at maturity.

'DIANA'

*Distinguishing features:* This is a mid-flowering clone. Flowers appear up to the end of March. The individual flower is 16.0 cm. across, open faced, compact, belladonna type, bicoloured and streaked. There were also 6-8 broadly placed, thick marked rib-like streaks (signal red 719) are spread at the middle of the perigone (Fig. 23). Tepaltube 2.0 cm. long, Paraperigone - present, Eye present, 0.5 cm. wide. This is a non-seed-setting clone.

*Botanical characteristics:* Plant evergreen, leaves dark green in colour and 55.0 cm. long and 5.0 cm. broad. Scape 50 cm. tall, green, 2 in a season, appears after an interval of 10-12 days. Umbel 4-flowered, Pedicel 7.5 cm. long, straight. Flower 16.0 cm. across, open faced, with a marked white star up to  $\frac{3}{4}$  of the perigone. The streaks (signal red, 719/2) appear-



Fig. 22. *Amaryllis* hybrid clone - 'Apollo'.



Fig. 23. *Amaryllis* hybrid clone - 'Diana'.



ing from base are spread up to  $\frac{3}{4}$  of the perigone. *Perigone*: 16.0 cm. across, 12.0 x 8.0 cm., tips recurved. *Paraperigone* - present, densely populated - bristle. *Tepaltube* 2.0 cm. long. *Tepalsegs*, ovate, *Liptepal* 9.5 x 5.0 cm., above half coloured and streaked. *Eye* - present, 0.5 cm. wide, *stamen* 8.0 cm long, *Anther* 1.8 cm. long, purplish, *Style* 10.0 cm. long, recurved. *Stigma* trifid & lobed (0.4 cm. wide).



Fig. 24. *Amaryllis* hybrid clone - 'Sydney Percy Lancaster'.

'SYDNEY PERCY LANCASTER'

*Distinguishing features*: Flowers in this variety appear up to the middle of March. The individual flower is 14.5 cm. across, open faced, belladonna type and white with Jasper red (0.018) streaks (Fig. 24). *Tepaltube* 3.0 cm. wide, *Paraperigone* present, *Eye*, present, 1.0 cm. wide. This is a sterile clone.

*Botanical characteristics*: *Plant* evergreen, *Leaves* green in colour, 4-6 in number, size 50.0 x 4.0 cm., tips pointed. *Scape* - 48.0 cm. tall, green, 2 in a season. *Umbel* - 4 flowered, *Pedice*l 5.5 cm. long, straight. *Flower*, open faced, belladonna type and having white base and Jasper red streaks over the perianth lobes. The streaks were very dense at the middle but narrower towards the tips. *Perigone* - 14.5 cm. across and 12.0 cm. long, regular but tepals loosely aestivated, tips recurved and frilled margin.

*Tepalsegs*, ovate, unequal in sizes, *Lip* tepal 10.5 x 4.0 cm. *Eye* present 1.0 cm. wide. *Stamen* 8.5 cm. long, smaller to perigone and styles. *Anther* 1.8 cm. long, and yellowish. *Styles* 14.0 cm. long and smaller to perigone. *Stigma* 3 lobed, lobes unequal (1.0 cm., size) and recurved.

#### ACKNOWLEDGEMENTS

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## ADVANCES IN CRINUM BREEDING (Part II)

T. M. HOWARD

Anyone contemplating the hybridizing of *Crinum*s must be prepared to dedicate a decade, at the very least, to this purpose. Hybridizing is a time-consuming venture, and in order to be done properly, the neophyte breeder will have to spend a few years, before even starting, in acquiring several good species known to be reliably seed fertile, and other good hybrids—either seed-fertile, pollen-fertile, or both. The biggest obstacle is in getting a stock of species and hybrids that will set some seed with regularity. Some of these may be much too scarce to obtain, but a few will be available from *Crinum* collectors, if not from commercial sources. The writer's favorites are *C. scabrum*, *C. schmidtii*, *C. moorei*, *C. americanum*, *C. yemense*, *C. bulbispermum* (in all its variations), *C. zeylanicum*, and good, fertile hybrids like 'Cecil Houdyshel', 'Carnival', 'Skyrocket', 'Bridesmaid', and a host of *C. x powellii* forms. There are many more species and a few hybrids that are fertile, but most of these are not available or set seed too infrequently to be in a primary listing.

#### CRINUM SCABRUM HYBRIDS

x "HOLIDAY": This is a cross between *C. scabrum* and the Australian hybrid 'Bradley'. The latter is a complex hybrid involving *C. scabrum*, *C. moorei* (or *C. schmidtii*) with *C. flaccidum*. The flowers and foliage result in a near xWorsleyi type, but the bud count is only 7-8 at maturity, and flowers are quite large and shaped like *C. scabrum*, save that the base color is a clear medium-pink with rosy-red midrib. This creates a



decidedly contrasting bicolor striped effect of red and pink and the effect is handsomely striking. Foliage and scape are fairly low and compact and the flowers last quite well and have a wonderful *scabrum* fragrance. This hybrid promises to be well accepted in the future, as it propagates reasonably well, has exceptional quality in the individual flowers, and handsome foliage. It is one of the better versions of the all-new "pink" *scabrum*s.

x 'Carousel'—a hybrid of *C. scabrum* x *C. macowanii* and somewhat intermediate between the two in all respects. The umbel is quite large, with up to 15 buds forming a radially symmetrical head sixteen inches wide. The fragrant flowers are large with six inch tubes, segments five and a half inches long and 1½ inch wide. The interior is white with a faint pink midrib, and the exterior is keeled a dull purplish rose. 'Carousel' is a very lovely plant with low husky, handsome foliage and scapes only 18" to 20" tall. It would be a great landscape plant were it not for the fact that the flowers begin drooping in the morning. Thus, it is really to be regarded as a night bloomer, and this is its major fault, a fault that it shares with both of its parents.

*C. scabrum* x 'Seven Sisters'. There are two siblings, each different. The first, 'Chipotle', strongly resembles *C. scabrum* in flower and foliage, but has a different fragrance, and purplish-red stripes. The scape is rust-red. It seems to be seed-sterile and has made no offsets. Though very attractive in its own right, it resembles *C. scabrum* too closely to merit the extra space.

The second sibling, 'Tabasco', is much more interesting, with taller scapes, higher bud count and little or no fragrance. The flowers are only of medium size, but they open widely and tilt upward. There is a bright red stripe, both inside and out. The fact that one of its parents has *C. americanum* in its genes accounts for the better-than-average substance of the flowers. It remains in good condition until the afternoon sun forces the flowers to finally droop. Thus far 'Tabasco' has not shown any inclination to form any offsets.

x 'William Herbert'—the result of crossing *scabrum* x 'Ollene', making it a third generation hybrid. In essence, 'William Herbert' is an unusually large-flowered *platyaster* hybrid with a striped *Milk-and-Wine* pattern. But this oversimplification does not convey the true tale. The flowers have an astonishingly good form, size, substance, fragrance, and coloring. The form is almost flat, with the flowers spreading to dinner-plate size (10½"). The substance is as good (if not better) than most other striped forms, lasting two days and nights without wilting under a hot August sun. The fragrance is rich and intoxicating, with a combination of the spicy and sweet tones of both *C. scabrum* and *C. americanum*. Segments overlap nicely and spread to 1-¾" wide. The stripe is a vibrant cherry rose-red and contrasts nicely against the lighter background. The background itself is most interesting in that, while it gives the illusion of white from a distance, it is

not really white at all, but a pinkish-white with a light veining and freckling of light red extending away from the stripe. Foliage is partly erect, husky and heavy, tapering moderately to a bluntish tip. The color is a bright, light green. At this writing, the original bulb had three fairly large offsets when it flowered for the first time. Keeping in mind the adage that "Every mama crow thinks her baby is the blackest", this writer feels that 'William Herbert' epitomizes *Crinum* breeding at its very best. Even the stout, shortish, rust-red scapes, the wine-red floral tubes and amber pollen all add to the festival of the startlingly colored flowers. With such a combination of



Fig. 25. *Crinum* hybrid clone, 'William Herbert' (*C. scabrum* x 'Ollene'); outstanding for large good form and striped Milk and Wine pattern, and fragrance, and "dinner plate" size.

size, form, coloring, and fragrance, we could overlook a flaw in its substance, but luckily we don't have to. The substance is equal to the best. About the only flaw, (and this is a very minor one) is the bud count, which was only eight on its first flowering. In this instance, a higher bud count might not be desirable as the large, sessile flowers are so big that the petals intertwine by the second day, creating the illusion of a big, shaggy, paper pom-pom. More buds might only accent this shagginess in the umbel, to the point of shapelessness.

We can't help but feel that all three species (*scabrum*, *bulbispermum* in two different forms, and *americanum*) each had a large part in the formation of this unusual hybrid. It seems unlikely that one might obtain this kind of hybrid in an F-1 cross. It required three generations to do it. Excellent as this hybrid is, it cries out to be crossed onto a pink-flowered plant that will set seed with some degree of certainty, such as *C. moorei* or 'Cecil Houdyshel.' Though white in color, *C. schmidtii* would result in pink flowered hybrids too. One can only hope that such crosses would result in hybrids with most of the same qualities as 'William Herbert', but on a distinctly pink-to-red background, with contrasting stripes. The only unanswered questions about this hybrid now, is its hardiness, number of scapes per season, highest bud count, and pollen fertility. Past experiences with its parents and grandparents indicate that it should pass with flying colors on all counts.

*C. scabrum* x *powellii* var. 'Krelagei'. A half dozen clones resulted from this cross, and one of them flowered for the first time in 1981. In foliage, this sibling took the foliar habits of *C. scabrum*, while the rest emulates x *powellii*. This first sibling was extraordinarily good, but I feel that I must flower all the others before any selection is made, as they might vary only slightly in some important details. The old x *powellii* var. 'Krelagei' is one of the prettier and more delicately colored variations on the standard x *powellii* theme, and this is carried over into the new seedling, but with the lovely *scabrum* form added. The new seedling is a very pale lavender-pink both inside and out, but the tepal tubes are a rich wine coloring and this extends into the keels. The interior is the same lovely and delicate lavender-pink with contrasting purplish-rose midribs. The pedicles, floral tube, and filaments are all of the same bright purplish-red, and this all seems to add to the coloring. Fragrance is light, but *scabrum*-like. Substance is fair, with the flowers starting to droop shortly after noon. This hybrid seems to point in another new direction away from older, existing hybrids, and has better-than-average potential. The clone already has one offset.

#### THE "SUPER WORSLEY" HYBRIDS

At the same time that *C. schmidtii* was crossed with *C. scabrum*, some parallel crosses were made with pollen of x 'Carnival'. The resulting crosses were similar in foliage, and later in the flowers, to 'Worsley', but clearly these crosses involving 'Carnival' were more robust, suggesting polyploidy. The best of these was named 'Garden Party'. Flowers are a rich dark-pink with darker midrib, have a high bud count, good *scabrum*-like form, pleasing fragrance and good substance. They hold up well in heat, and the scapes are strong enough to prevent them flopping over from their own weight. Offset formation is good. Pollen is potent, but so far they show no inclination to set seed. While we feel that the x *worsleyi* hybrids are excellent in their own right, we feel that the "super-worsleyi" hybrids are even better.

x 'Walter Flory' (breeder: 'Katherine Clint'): Though not technically a x 'Worsleyi', it seems to belong in this section. Foliage and flowers fall into the expanding 'worsleyi' group which now consists of the true x 'Worsleyi's', the new 'Super-Worsleyi's', 'Holiday,' and 'Walter Flory'. All are worthy garden plants, but the *worsleyi* clones seem to compete head-on with the "Super-Worsleyi" clones and "Holiday" competes head-on with 'Walter Flory'. In each case, the "Super-Worsleyi" clones and "Holiday" win over the competition substantially. But "Walter Flory" is especially interesting in that it is the first recorded cross between two very popular old hybrids . . . *C. powelli alba* and 'Ellen Bosanquet'. Typically, it has the "Worsleyi" form and coloring—flowers somewhat like *scabrum* in form and size, and of a rich pink background with contrasting darker midrib, and white throat. The genes of three species (*scabrum*, *moorei*, and *bulbispermum*) lurk in its background, and it should make a fine pollen-plant in any breeding program.

#### X "CARNIVAL" HYBRIDS

Although the exciting variegated red-flowered hybrid 'Carnival' has scarcely been launched, it already is the pollen parent of several new hybrids. First, it is the parent of the new "Super-Worsleyi" hybrids, such as x 'Garden Party' and 'County Fair'. When its pollen was applied to the venerable old hybrid 'Cecil Houdyshel', we obtained the astonishing new wine-red hybrid 'Mardi Gras.' This new clone seems to also give us another new direction in *Crinum* hybrids. 'Mardi Gras' has fertile pollen and in the summer of 1981 even set a few seed, which though small, seem viable. (And it now has several offsets). But 'Carnival' pollen has also been applied to *C. bulbispermum*, and one clone, 'Bo Peep', has flowered and already seems to be quite unique in its own right. This plant is particularly hardy, and will take lower freezing temperatures before losing its foliage than nearly all other hybrid *Crinums*, and is the equal to *C. bulbispermum* in this. Flowers are a bit similar to *C. bulbispermum* in size but the trumpets are shorter and the segments blunter. What makes the new hybrid notable is its unusual coloring. Upon opening, the flowers are about the same size and coloring as *Habranthus brachyandrus*. That is, the interior is a very pale pink, with darker throat. The exterior is darker, at first reddish, but quickly aging to wine-red. The interior darkens rapidly as it ages, and the throat becomes wine-red, as the pink coloring deepens. In effect, it looks like a bouquet of *Habranthus brachyandrus* on a tall stem. Thus far no offsets, but the pollen is potent, and has already been used on *C. scabrum* with some nice seedlings resulting.

#### 'OLLENE' SIBLINGS

In 1962 the writer applied pollen of 'Seven Sisters' (origin unknown) to a special form of *C. bulbispermum alba* having upfacing, bluntly tipped, broad-petaled white flowers. There were five siblings, all very similar, and



## 'OLLENE' SIBLINGS

differing mainly in size and bud count. The best of these was selected and named 'Moonglow'. Unfortunately it was soon lost, as were most of the others. One of the survivors was named 'Ollene' (for a friend, Ollene Bundrant) and it has since proved to be a hybrid with some notably impressive credentials. Like its pollen-parent, 'Seven Sisters', and like 'Cecil Houdyshel', 'Ollene' is blessed with one of the best everblooming habits in "Crinum-dom". Five to seven scapes per year is par. The flowers open widely and the bud count is good, with many buds open at one time. A product of *Codonocrinum* with *Platyaster*, the flowers are a bit more *Platyasterish* in form. The flowers are usually pure white, but in cool weather there is often a touch of pink in the keels. They are really at their best during the hottest months, although they are one of the first *Crinums* to flower early each season, and the last to stop in the fall. Pollen is scant, but potent. 'Ollene' is the pollen parent of the fantastic 'William Herbert'. Genetically, 'Ollene' is one part *C. americanum* and two parts *C. bulbispermum* (in two distinct forms).

*C. SCHMIDTII* X *C. MACOWANII*

Several siblings resulted from this cross, but only two have bloomed. Both are more or less intermediate, but one sibling favors the *C. schmidtii* parent in form and color, while the other seems to lean more toward *C. macowanii*. The one favoring *C. schmidtii* is clearly the prettiest of the two, and has been named 'Coquette'. Perhaps it is a bit premature to christen this seedling, but the flowers are very fine. They are a clear light pink (nearly blush) and open flatly. It is this very patent (wide-open) form that endears them. Segments are acceptably broad, and so is the size. Bud count on its "maiden-voyage" was low, but this can change as the bulb matures. The other siblings are too small to flower until at least 1983 so we will have to reassess this cross in the future. In the meantime 'Coquette' seems to be a future entry into the better hybrid forms.

x 'Snow Flurry'—A bit of an odd combination between the unusual white-flowered form of *C. bulbispermum* ('Granny') with the erect flowers having the blunt, broad petals and a pink-flowered form of x *C. powellii*. In this case, the foliage is a dark, shiny, bright green, and of x *powellii* form, and the flowers are snowy white, not-too-large, but with unusually blunt, wide segments, and carried proudly. It is no threat to x *powellii* var. *alba*, but still it is not "chopped liver" either! It has a very different, and pleasing personality. Only time will tell where it fits into the overall scheme of things, but so far, we like it. No offsets yet.

*C. MOOREII* X *C. MACOWANII* (L. BUNDRANT)

x 'Skyrocket'—this cross has been done many times, but since there are so many forms of *C. macowanii*, and quite a few of *C. mooreii* too, repeats of this cross won't necessarily result in similar hybrids. In this instance the *C. moorei* form was one of those very "mousey" pale forms that seem to grow well enough in Texas. Likewise, this particularly small version of *C.*

*macowanii* is a "mouse" too, with small tulip-shaped flowers on a very short scape. The marriage of two sad little mice! If one lived in California, one would normally select a better form of each parent, and wind up with very different results! In this case, the cross (and its reciprocal) gave four hybrids. All had very low foliage, and very short scapes. Three were pale pinkish, but one was a very deep pink. All had unusually large umbels of smallish, tulip-shaped flowers, that were unusually seed-fertile. The darkest pink was not only best in color, but best overall, and was named 'Skyrocket'. Unlike most hybrids, it sets seed heavily. Offset formation is fortunately adequate, since the other siblings show little desire to propagate by this route. 'Skyrocket' is compact enough for pot culture and is no larger than most *Clivia*. The bud count is especially large, with up to 20 . . . or even more . . . buds in the umbel. The breeder is Luther Bundrant.

C. X POWELLII VAR. "ALBA-CARNEA" (L. BUNDRANT)

This was an attempt to duplicate *C. powellii* var. *alba*. A form of *C. bulbispermum alba* was pollinated by *C. schmidtii*. An interesting series of seedlings resulted, but although mostly whitish, they had a faint hint of blush pink overall. Although they failed to duplicate the older hybrid, they proved very successful in their own right. For one thing, they flower several months earlier each spring, and they have a different coloring than the rest of the x *powellii* group. In hot weather, they are almost pure white, and in cool weather, they are blushed with a bit of pink, but the overall effect is still whitish. There are some excellent selections in this series, and now and then they have proved to set a few seed.

C. X "SUMMER NOCTURNE" (C. AMERICANUM ROBUSTUM X C. MOOREI)

In the early sixties, the writer made a cross of *C. americanum* var. *robustum* on a pale pink form of *C. moorei*. The latter is a mousey form that does well enough in the Gulf coast states. The cross had been made successfully long ago in the form of 'H.J. Elwes.' This writer had a love-hate relationship with that old hybrid. When in flower, it was one of the prettiest *Crinum* to be found, but getting it to flower was the rub. The hybrid seemed obsessed with formation of offsets, and flowered infrequently, and then only when given very rich soil and an unusual amount of irrigation. Thus I could only flower it once every few years at best, yet I was inundated with far more offsets than I could give away. Definitely not to my liking! But when I duplicated this cross using two different forms of each species, I obtained very robust seedlings that flower freely and reliably each year. True, the flowers were of the same mousey pink as the seed parent, but they are much larger. It took us a few years to fully evaluate it, but then all at once it was clear that this hybrid was out-of-the-ordinary and performed very nicely. It was then that we decided to launch it as a named clone, so we named it 'Summer Nocturne', which seems to fit its mood. The flowers open widely,

have reasonably good bud count, with more than half of the center of the flower being pure white, and the rest being a nice soft pink, to the tips. Some might call it a bicolor. Although offset formation is very good, it still isn't an obsession (like 'H.J. Elwes') and it will bloom each year. Fragrance is, quite naturally, very heavy and sweet. 'Summer Nocturne' does best in rich soil and adequate irrigation, but it will grow equally well, as with most good garden crinum, with minimum care. Its pollen has proved fertile.

Hybridizing is not static. Much new material has been forthcoming since Hannibal's booklet of more than a decade ago. Perhaps the biggest flaw in his analysis is that each and every hybrid was the result of some breeder crossing two species. It is now quite apparent that many of the old hybrids resulted as second generation hybrids, and perhaps a few were the result from a third generation. It is doubtful that anyone got beyond that, as the mere pressure of living long enough became the main criterion. And one would have had to have a very early start! The writer began at age twenty, yet at age fifty-two, is only just now reaching for the *fourth* generation. At this point, I would say that it is safe to assume that one will only average one generation per decade, unless one is very disciplined, and driven by pure obsession. There are many pitfalls between initial pollination and the flowering of a new hybrid.

Above all, we must avoid making generalizations based only on one's own limited, personal experiences. Too often this has been done, only to the embarrassment of those doing so. Experiences of others may differ completely. These must be taken into account. As an example, one hybridizer boasts of making nearly a hundred hybrid crosses on 'Cecil Houdyshel', and found that only about four of these seedlings were different enough to merit much comment. The conclusion was that 'Cecil Houdyshel' was of little value as a breeder. Statistically, this would be most impressive were it not for the fact that much of this hybridizing involved back-crosses, selfs, and similar interbreeding. In short, it was merely a spinning of wheels. By the same token, several other breeders (the writer included) made only token crosses using 'Cecil Houdyshel'.

With more remote hybrids, more astounding results are obtained. The first to do so was the late Mr. Houdyshel himself, when he crossed 'Cecil Houdyshel' with pollen of 'J.C. Harvey' and obtained his famous 'Virginia Lee'. Much more recently Fred Jones pollinated 'Cecil Houdyshel' with that of 'Peach Blow' (a real outcross) and got his outstanding 'Emma Jones'. About the same time Mrs. Grace Hinshaw crossed 'Cecil Houdyshel' with 'Ellen Bosanquet' to obtain 'Summer Glow', and with *C. americanum* to get 'Elina'. Though having been warned to avoid 'Cecil Houdyshel' as a breeding plant, I finally decided to get on the "bandwagon" by following the lead of these pioneers, and thus I crossed 'Carnival' on 'Cecil Houdyshel' and obtained 'Mardi Gras'. Thus four different breeders, not having the luxury of attempting one hundred seedlings from 'Cecil Houdyshel', had to settle for one each, or so, and still came up

with some highly variable offspring. Like the bumble bee, which is technically constructed in such a way that it cannot possibly fly; it flew.

CRINUM CROSSES MADE BY LUTHER BUNDRANT

The following list of hybrid crosses were attempts that resulted in hybrid(?) seed production in the years 1973, '74, and '75, by Luther Bundrant.

The following species and hybrids were used as the *maternal* parent. BRIDESMAID'S SISTER (*C. Macowanii* x *C. bulbispermum*) T. Howard. *C. bulbispermum* var. *alba*, *C. Loddigesianum*, *C. Macowanii*, *C. Americanum* var. *robustum*, and *S. scabrum*.

1. x BRIDESMAID'S SISTER (*Macowanii* x *bulbispermum*); x *Schmidtii*; x *Mooreii*; x POWELLII VAR. ALBA — ONE; x *scabrum*; x SUMMER NOCTURNE (*mooreii* x *americanum robustum*).

2. *C. bulbispermum* var. *alba*; x *scabrum*; x *schmidtii*; x *loddigesianum*.

3. *C. loddigesianum*; x *cruentum* 1974; x *submersum* 1974; x *scabrum* 1975.

4. *C. Macowanii*; x *C. Mooreii*; *C. Procerum*; *C. SUMMER NOCTURNE*.

5. *C. americanum* var. *robustum*; x MAIDEN'S BLUSH (*mooreii* x *zeylanicum*) 1973.

6. *C. scabrum*; x CANDY (*scabrum* x *bulbispermum* Orange River form) 1975; x CARNIVAL (*C. bulbispermum* x THADDEUS HOWARD (*scabrum* x *bulbispermum alba*); x 1975.

7. EAGLE ROCK x *C. submersum*, one seed—lost.



## 4. AMARYLLIS CULTURE

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

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### PROMOTING MORE BLOOM ON AMARYLLIS

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Many people are satisfied with a scape or two per bulb each year, but with some attention to growing conditions better performance can be obtained. European type hybrids have been selected for color and form and not for quantity of bloom, therefore much variation will be noted. Some are capable of four scapes in the spring and a couple more during the summer and fall. It would be logical to believe that selection for more bloom would give cultivars that would produce several more scapes per year. With good growing conditions, bulbs are produced that are six inches in diameter, sometimes with 18 leaves, four inches wide and four feet long in a seven inch pot.

These conditions are:

Full sun from sunup to sundown.

High temperatures during the growth cycle. Ninety degrees or more during daytime. Night temperature should also be high as good growth is observed with night temperatures down to seventy degrees. During resting cycle cooler temperature can be tolerated but at least fifty degrees should be provided. Some evidence seems to indicate that low temperature periods are required by some cultivars to initiate the next growth cycle.

Potting mixes should be made of materials that maintain their physical properties for several years because bulbs are shocked by repotting and should not be repotted any oftener than necessary.

Potting mixes should have about 10% aeration. To obtain this requires the use of materials that maintain large pores like sands or calcined clay. Fine material in the mix should be avoided because particles smaller than 30 mesh rapidly decrease the aeration. Some particles up to 1/8 inch are permissible. Up to 20% peat (or peat and vermiculite) can be used to increase water holding. In very hot dry climates Vittera 2 might be useful. The mix should be tailored to match climatic conditions and watering practice. Watering practices will have to be adjusted to prevent any stress on plant because of low moisture availability. Lime and dolomite should be added to the mix, the quantity to obtain pH7.

Constant liquid feed should be maintained during growth cycle. In Southern California I feed only four months, may through August. The remainder of year plain water. The liquid feed might have to be adjusted to fit the climate, but here I feed 75 p.p.m., N, 40 p.p.m.  $P_2O_5$ , 90 p.p.m.  $K_2O$ , 80 p.p.m.  $Ca^{++}$ , 9 p.p.m.  $Mg^{++}$ , 35 p.p.m.  $SO_4$  with micro nutrients. The required total quantity is about one pound of nitrogen per 100 square feet of soil surface per growth cycle. Of paramount importance: Nitrogen must be at least 95% nitrate source. Ammonium forms (all organics) cannot be tolerated. pH of soil should be maintained as close to seven as possible. Below 6.8 invites trouble and over 7.5 blocks off some nutrients. Keep salinity as low as possible consistent with adequate fertility.

Offsets should be removed from old bulb 2 or 3 times a year. If the offset is allowed to grow, the old bulb "feeds" it at the expense of itself. Leaves should never be removed until they wither. Some moisture should be provided in the fall as long as plant needs it. Usually by mid-November or early December they will no longer use moisture but will remain green. At this time watering should cease until leaf growth resumes in the spring.

## GENERAL AMARYLLID REPORT—1982

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### WINTER AND SPRING-FLOWERING AMARYLLIDS

The amaryllid year began with the flowering of *Amaryllis papilio*. This is the largest species I have grown in this genus, both in flowers and foliage. The large red and green flowers appeared in January. They approach some of the smaller commercial hybrids in size. Their butterfly shape is of outstanding form. *Amaryllis papilio* produces long, dark clivia-like leaves, and numerous offsets. The plants don't seem to require any definite dormant period and retain their leaves throughout the year. Also, this species seems to be one of the more hardy ones, growing outdoors all year here. It appreciates shade or filtered light.

The unusual *Amaryllis cybister* flowers for me several times a year. After a long dormancy it flowered in March and April. The large bulbs normally send up two scapes. The sprekelia-like flowers, with their spidery, curving segments have unique form. This species also produces several offsets, and, as in the previous species, the plants are large. It is apt to flower at unexpected times.

Also flowering in March were *Clivia gardenii* and *Clivia miniata*. The former species is the largest-growing Clivia I have, although it varies by clone. The flowers, which are pendulous in the umbel, are similar to *C. caulescens* but slightly larger. It has fewer flowers per umbel than *C.*

*nobilis*, another pendulous species. *Clivia miniata* is the first species in the genus to flower each year. It has been discussed several times before and further detail is not needed here. One note—unlike other species, *C. miniata* usually flowers just once a year.

*Hymenocallis macrostephana* flowered again in April. This purported hybrid (*H. speciosa* x *H. narcissiflora*) has large umbels of tangled, white, fragrant flowers. April may not be its normal flowering time but last year it was shifted back and forth between the greenhouse and the yard. No seeds were produced. The flowers look most like *H. speciosa*, although they have a certain disorder in the umbel.

May was the start of the main amaryllid flowering season. Flowering this month were *Sprekelia formosissima* 'Orient Red', *Crinum schmidtii*, *Crinum* x Cape Dawn, *Hymenocallis speciosa*, *Amaryllis blossfeldiae*, *Scadoxus multiflorus* ssp. *multiflorus* (*Haemanthus multiflorus*), *Clivia miniata* var. *citrina*, *Amaryllis parodii*, and *Crinum amabile*. Several of these have been mentioned in depth in previous articles. I will just make a few observations.

*Amaryllis blossfeldiae* flowered for the first time for me. It produced small, orange flowers, two to an umbel. The plant has many offsets, as in *Amaryllis striata*. I am growing *A. blossfeldiae* outdoors now (in a pot) and will probably keep it there all year. So far, no problems have resulted—it is larger now than when in the greenhouse.

*Amaryllis parodii* also flowered for the first time. The long-tubed, greenish-yellow flowers were a match for the broad, round-tipped haemanthus-like leaves. I would not consider the flowers beautiful in form or color but they are of much interest to the species collector.

The form of *Clivia miniata* var. *citrina* that flowered was obtained from the San Diego Zoo. This clone has broad, large leaves, similar to the Belgian Hybrids. The creamy-yellow flowers had broader segments than wild type *C. miniata*. This yellow clone flowered the first year after acquisition. Another yellow clone has not flowered, although it was acquired in 1973. However, it has spent much of that time in containers, which did not seem to suit it. It is growing well now in the ground, except for an occasional mealybug invasion. A third yellow cultivar, 'Aurea' is several years away from flowering.

June brought flowers from *Clivia* x *cyrtanthiflora*, *Scadoxus* (*Haemanthus*) *membranaceus*, *Crinum asiaticum* 'Cuprefolium', *Eurycles amboinensis*, *Crinum japonicum* and its cultivars 'Akebono' and 'Han-ire'.

*Clivia* x *cyrtanthiflora* has become quite free-flowering, the scapes appearing several times a year. This *miniata* x *nobilis* hybrid has flowers very similar to *C. nobilis*, showing little of its *C. miniata* parentage. One clone attempts to produce seeds. It now has large fruits forming, although these may not mature.

*Crinum japonicum* 'Han-ire', the spotted-leaved *Crinum*, sent up two scapes per plant. In two cases, the plants produced a short scape, almost

hidden by the leaves, followed by a tall scape, which far exceeded the leaves. The latter scape also formed fruit. None of the fruits is mature at this writing. The fruit, like the leaves, scape, and subtending bracts, is also spotted. In the next report I will be able to state if this cultivar breeds spotted leaves freely from seed.

*Eurycles amboinensis* was the last amaryllid to flower in the spring. It flowered in late June, lasting into July. This species is notable for its broad, aroid-like leaves, and its exquisite, white flowers. It is among the choicest of amaryllids. Unfortunately, it requires warm, tropical conditions to thrive. It may be considered the Asian counterpart to *Eucharis*.

The amaryllids discussed in this article are not the only ones in my collection that should flower in the winter and spring. Others are temperamental and either never flower or don't flower regularly. Also, the amaryllids discussed here may not be restricted to winter and spring for flowering. Environmental conditions and cultural practices often can alter the flowering season, or can eliminate flowering entirely.

## 1982 ZEPHYRANTHEAE COMMITTEE REPORT

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NEW HYBRID, CAPRICORN (See Fig. 26, page 112)

This year a new *Zephyranthes* hybrid of Dr. Thad M. Howard will be registered. The new hybrid, 'Capricorn', is a 2" diameter bicolor of yellow and burnt orange (HCC Brick Red) and represents a new level in breeding from among previous hybrids in the sunset shades. The intensity of color upon opening of the flower is similar to the small flowered seedling group from which 'Fire Ball' was selected. In 'Capricorn', we now have unusual color contrast, size and form. The bulbs are easy to grow and multiply and are free flowering from about early midseason. Flowers are fertile both ways.

Because of apomixis, extremes of both self fertility and incompatibilities, and the short life of each flower, the work of our pioneer hybridizers was achieved only through dedicated persistence. Major levels of change may still require time, patience and innovation in introducing new germ plasm; however, any hobbyist who enjoys planting seeds and growing seedlings may now enjoy quick success in hybridizing with Rain Lillies.

### HYBRIDIZING WITH ZEPHYRANTHES

*Fertility and Ploidy.* Among *Zephyranthes* and *Cooperia* hybrids, there are many more self fertile clones than infertile ones. Infertile clones



are more apt to be found among bigeneric hybrids (X *Sydneia* is *Zephyranthes-Habranthus* combination), *Habranthus* hybrids, severely inbred hybrids of *Zephyranthes*, and perhaps hybrids using *Z. albiella* and *Z. grandiflora*. Most species in Tribe Zephyrantheae are highly evolved and ploidy of the different taxa in *Zephyranthes* is rarely a handicap in breeding. The two known exceptions represent extremes in chromosome numbers, with *Z. albiella* having the lowest known number and *Z. grandiflora* among one of the higher. Sterility of hybrids with these two species may have nothing or little to do with their ploidy—perhaps a riddle that could be solved one day. Dr. Walter S. Flory, Babcock Professor of Botany, Emeritus, of Wake Forest University, has made numerous studies in the cytology of Amaryllidaceae. Results of many of his studies, with references to other published reports, may be found in past issues of Plant Life.

*Inbreeding.* Possibly the first notion that comes to mind when one sees a fine *Zephyranthes* hybrid making a seed capsule is: "I wonder what seedlings of that would look like? Would they be worthwhile?" YES. The per cent of superior hybrids might vary with different hybrids that are selfed, but many would make nice garden plants. Repeated selfing of succeeding generations will result in sterility—be sure and maintain your original hybrid clone and its offsets. I will be planting seeds of some of the superior Rain Lily hybrids and will possibly have something further to report at a later date.

*Hybrid x Hybrid, Hybrid x Species.* Achieving a good "take" with pollen from a different hybrid or species is a bit more tricky than hybridizing with many other genera. Pollen may mature before the flower is open or insects may carry similar pollen from adjacent plants. Deanther before the pollen matures. Also deanther any other flowers of the same clone blooming nearby, even if you do not intend to use them for seed parents. The stigma may be receptive soon after opening of the flower in hot weather, or by midafternoon. Pollinate early and heavily—repeat if time allows. In cool climates or in early spring or fall, the aging of the flower is much slower and the stigma may not be receptive until the second or even the third day.

If you are sure a particular hybrid is self sterile, experiments with hybrid or species pollen may be tried without deanthering. Of course, there is the risk of your pollination stimulating the formation of maternal seeds, but it is a time saving step that I frequently use.

*Everblooming Hybrids.* Storage of pollen is necessary if one wants to incorporate some of the traits of a spring blooming Rain Lily with one that blooms in mid-summer or fall. Hybrids between species that bloom early and late tend to be much more everblooming. *Z. smallii* is a natural hybrid of *Z. pulchella* and *C. drummondii*. *Pulchella* blooms in the fall with a bright golden yellow flower. The white *Cooperia* may bloom from late spring to fall. The result—*Z. smallii*—is one of our most vigorous and everblooming species. It is difficult as a seed parent, but its pollen has contributed much to the hybrids of Dr. Thad Howard.

## BRUNSVIGIA AND NERINE COMMITTEE REPORT — 1982

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### EXPERIENCES WITH BRUNSVIGIA HYBRIDS

For ten years I have been growing varieties of *Narcissus tazetta*, first as a hobby, and now for the last three years as a commercial cutflower crop. I chose them because they are rugged and long lasting, and it is my definite preference for this type of crop which has led me just recently to become much more interested in *Brunsvigia rosea* and its hybrids. *B. rosea* is very plentiful in old gardens in much of California, often growing where it received no care whatsoever, yet multiplying and blooming reliably each year for many decades. It is one of the very few cutflowers which are produced during the dry season without any irrigation whatsoever. The rainfall here averages about 18" per year, falling almost entirely from October through April. This is also the season during which the *Narcissus* flowers are produced. *Brunsvigia rosea* begins to flower in August, with the hybrids extending the season to the beginning of October. In the summer of 1978 I planted my first bulbs of one of the hybrids, a clone of *B. x multiflora alba*. This particular clone came from Ray Williams of Watsonville, California, who acquired the original bulbs many years ago from the late Mr. Orpet of Santa Barbara. Whether this white clone was of his own development or was among those he is known to have imported from Australia, cannot be determined. Apparently it is not bred from 'Hathor', since none of its seeds have the brown spotting characteristic of seeds not only from 'Hathor' but also from its offspring. This clone has a fully radial umbel, with up to 28 florets, increases quickly through offsets and seeds profusely when crossed with other clones.

Les Hannibal found that many of the *B. x multiflora* group were susceptible to the mosaic virus commonly found in *N. tazetta*, resulting in mosaic symptoms with a loss of vigor followed by eventual death of the plant. For this reason, though I have been interested in *Brunsvigia* hybrids for several years, it is only recently that I have gone into growing them in quantity. I wanted first to grow some for a few years in close proximity to the *Narcissus* to see whether they were doomed to destruction by virus. Three and a half years have passed, and the new leaves are now coming up, more vigorously than ever. Never has there been any sign of virus, so I know there is at least one clone which is resistant or tolerant of virus under my conditions. Last year I added approximately 2 dozen clones, which I selected and dug while in bloom at Les Hannibal's place. Better than half came into bloom again this year, without the skipping of a year which oc-

curred with both the whites and the common form of *B. rosea*. No virus appeared in their foliage last year, by this year it should be possible to determine for sure if any of them are susceptible to the *Narcissus* virus under my conditions. If none of them show virus in their upcoming second year of growth here, I will be much more certain of their permanance here. All of the hybrids I have referred to come under the heading *B. x multiflora*, being made up of  $\frac{3}{4}$  or more *B. rosea* in ancestry. Some are fully radial, but most tend to show the preponderance of *B. rosea* in their background by having an umbel which tends to favor one side, though few are as strictly side facing as *B. rosea*. The hybrids have from 10-20 florets per stem, but I would expect more as they become better established. All set seed freely, giving up to 30 or more seeds in the larger pods (which always come from the first florets), and proportionately fewer seeds from the later florets to open in the cluster. I have seen the same thing on large heads of *Narcissus*. None of the hybrids are a true *dark red*, but some are of quite intense *rose red* and always darken when a cool (foggy) night is experienced.

The white clones I have seen all have some amount of apricot in the throat, with the one from Ray Williams having it extend about  $\frac{1}{4}$  the way up towards the tip, which is about as good as most I have seen. I think it would be a worthwhile long-term goal to work towards intensifying the amount of apricot, with the eventual aim being a new color, the all-apricot flower.

I am also working toward redder reds, as there is not that much difference in intensity of red between the reddest of the hybrids grown in my inland conditions, and the ordinary *B. rosea* greatly darkened by being grown under coastal (foggy) conditions.

I am particularly interested in increasing the number of florets per stem, hopefully without losing too much of their size, and toward this end I am starting to form a collection of *Brunsvigia* species. I expect to be getting seeds, and I hope bulbs, from sources both in South Africa, and in this country, but at this time I have no species other than *B. rosea*. Les has had much trouble with loss of bulbs of those hybrids which show the most characteristics of the other *Brunsvigia* species, due to his wet, foggy, Central Valley springs. I think this has resulted in a higher amount of *B. rosea* blood being present in most of his hybrids than would be desirable from the standpoint of larger fully radial umbels. Those showing more of the other species' characteristics have simply not survived to bloom. I am particularly interested in getting other species involved in these hybrids that have not been used before. Perhaps the reportedly strong red of *B. marginata* would be of help here. It is much dryer and warmer here during the winter than in the Central Valley, so perhaps the water-sensitive types can be grown more successfully here.

I would like to hear from anyone who is interested in these, whether in this country or overseas, with the aim of exchanging bulbs, seed, or pollen. I am new to this particular line of work so my collection numbers only

about 2 dozen clones, plus several thousand 1 year old seedlings. This year's seed crop is many times larger than last year's so there should be a large number of seedlings coming into bloom here in a few more years. This is a new field of study for me and I have much to learn.

Much is said of Nerines and Brunsvigias requiring an inorganic soil. Having not experimented for growing *Brunsvigia* species otherwise, I cannot offer much evidence to contradict this. But I have found, at least with the Orpet white clone, that growing some in a mixture of approximately  $\frac{1}{2}$  oakleaf compost and  $\frac{1}{2}$  soil has giving much better growth than those growing under ordinary soil conditions. One particularly noticeable result is that those with compost are much more fertile, and in addition give much larger seeds (3-4 times as large by weight), even from the same crosses. There is of course much better water retention in such conditions, so that it is always thoroughly moist 2" under the surface, even at flowering time. They receive irrigation only from winter & spring rainfall.

I grow everything organically. That is, no synthetic chemicals are used whether that be pesticides, fungicides, herbicides, or chemical fertilizers. My bulbs are happy in the grass, and take care of themselves. I use wood ashes, both mixed in the soil at the time of planting, and also as a top dressing when the plants are in growth. Not only have I found this to be an excellent fertilizer, I have also found it very effective in preventing attack by the various bulb flies which bother both *Narcissus* and Brunsvigias. Fly damage was once common in susceptible varieties of *Narcissus*, now I rarely encounter infested bulbs. I have read of ashes being effective against fly damage to vegetable crops, and knowing that the various root-maggot type flies are quite closely related, it came as little surprise that I have had such good luck. In planting out the seedlings I put several natural fertilizers into the soil: rock phosphate, greensand, kelp meal (seaweed), in addition to the ashes. This is the same as I am now doing for the *Narcissus*, in fact I grow the Brunsvigias exactly as I do the *Narcissus*. However, it should be emphasized that my *Brunsvigia* experience is entirely limited to the hybrids made up mostly of *B. rosea* blood, and I can see that perhaps a poorer, more sandy soil might be best for the other species. My soil is heavy, making it hard when dry, but is not of the adobe clay which plagues many people in this state.

An interesting thing in the matter of seed production has shown up this year. All plants received pollen from those with the largest, most fully radial umbels. I noticed a great intensification of one characteristic among the seeds: A large percentage of them, on some clones up to half, were unusually small. Normally, most seeds are large, with only a few tiny ones. But this time tiny ones abounded, right alongside normal sized seeds. While a normal seed is in the range of  $\frac{1}{4}$ " in diameter, the small ones were  $\frac{1}{6}$ " to  $\frac{1}{8}$ " in diameter, but all show embryos so should be entirely capable of germination. Since most of the *Brunsvigia* species have smaller seeds than



*B. rosea*, it leads me to ask if I am seeing any throwbacks to the *B. orientalis*, *B. grandiflora*, or *B. josephinae* which are the other parents involved in these hybrids. After all, it is their characteristic of large heads which I am trying to intensify in the hybrids. Luckily, I can get an idea as to whether or not this guess is correct even before they come into eventual bloom since such throwbacks should have much broader foliage than the other hybrids and this would show up before blooming size is reached. I do notice some variation as it is among the hybrids, but have not studied this carefully enough to see which shapes seem most closely related to which shape or color of flowers. There does seem to be room for a tremendous amount of selection and hybridization among the Brunsvigias and I hope this article will help to stimulate interest in this group, and hopefully also response from others who grow them or are becoming interested. How about any Australians out there who might have some of the original Bidwell hybrids, which being of the F<sub>1</sub> generation would be much closer to the other parent than the present hybrids, being B<sub>1</sub>, are.

## AMARYLLIS AULICA, NATURALIZED IN SOUTHERN CALIFORNIA

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*Amaryllis aulica* Ker-Gawl, was first described in 1817 and introduced into culture in 1819 according to Dr. H. P. Traub (*Amaryllis Manual*). This species has several excellent horticultural characteristics which make it an outstanding plant for gardens in subtropical areas with a Mediterranean climate such as Southern California.

*Amaryllis aulica* is South American. Its range extends from Central Brazil into Paraguay. *Amaryllis aulica* has been used to some extent in crosses which produced the so-called Dutch hybrids, but it deserves to be more widely grown out-of-doors.

The bulbs do best in about one-half sunlight. They make, however, magnificent plants when grown in full shade, but under such environment they are likely to flower erratically. Any well drained, reasonably fertile garden soil, with slightly alkaline reaction, is adequate for good growth of these bulbs. They are not fussy about soil requirements. When placed in a congenial milieu the bulbs multiply vigorously. One bulb within a span of 2 or 3 years will often have as many as 25-30 bulbs or bulblets; many will produce flower scapes.

Other virtues of *A. aulica* are as follows: (1) They have the capacity to produce flower scapes from September to January, thus adding a spark of magnificent color to an otherwise dull time of year in many gardens. (2) The

plants commence to go dormant in July and August. This is a signal to withhold water. They become fully dormant, and watering should not be resumed until the tip of the first flower scape appears, usually about September-October. (3) The flower scape makes an excellent cut flower. The flowers remain in good condition in the home at room temperature for as long as 2 weeks, perhaps longer.



Fig. 26. A large clump of *Amaryllis aurica* Ker Gawl., in bloom winter 1982 (14 scapes); as naturalized on the home grounds of Dr. Thomas W. Whitaker, La Jolla, Calif.

A description of the plants follows: bulb - round, slightly ovate, at maturity 5-0 cm diameter; neck - short; leaves - dark green, strap shaped (lorate), slightly furrowed, entire, obtuse, 30-50 cm long, 5 cm at widest point; scape - hollow, terete, 1.8-2.0 cm diameter, 30-36 cm long, usually 2 or as many as 4 flowers per umbel; pedicel - 2 cm long; ovary - 2.0 cm; tepalsegs - 9 cm long, 2 cm wide, acute, light green about  $\frac{1}{2}$  length, terminal half dark red; style and filaments light green half length, terminal half pinkish; filaments - 10.2 cm long; anthers - dark red; style - 10.3 cm long, length slightly exceeds anthers; stigma - trifid. The flowers are attractive and unusual, but hardly beautiful. The greenish throat, combined with the upper portion of the red tepalsegs make a striking combination. The clone I have in my garden never sets seed; thus it is safe to assume it is self-sterile. Dr. Traub informs me there are several cultigens of this species with flowers of different colors from the one I have described.

From my experience with this species, I am convinced it is a worthy horticultural subject deserving much wider cultivation in areas to which it is adapted.

## NORTH MIDLAND AMARYLLID REPORT — 1982

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The year 1981 was characterized by a basic change in lifestyle in that every effort was made to become more self-sufficient through a better and larger home garden. In this, *Amaryllis* were not loved the less but as the English do, they had to stand-up and compete with the rest of the garden on a productive basis. Twinges of conscience surfaced at first, but I made it a daily morning's habit to go over the whole garden every single day to enjoy the growth and bloom. At sunrise, I would see a bud about to open and at the evening after arriving home from work, I would scoot out to see what had opened and enjoy the color, form and fragrance when it was there. The old regular standby *Hymenocallis* (Peruvian Daffodil) bloomed at the regular time in the accustomed way but by fits and starts, it produced single blooms on massive pedicels without any hint of bloomstalk in sight. I do not know why but will watch, again, next year to see if this unique habit persists.

*Zephyranthes* were slow to start to bloom earlier in the season but as soon as cooler weather arrived, they bloomed heavily and well and as the wooden labels had rotted, some of these had become unknown strangers to me. In particular, a big, bright yellow *Zephyranthes* charmed me for days but whether it is a species from Dr. Ruppel or a hybrid from MARCIA'S is now moot.

The overall *Amaryllis* bloom indoors was much less in quantity but the quality was, in most plants, of much better color and size. The seed set was but a bare third of past seasons. The number of actively growing pot plants now exceeded the space that was available to them and Dr. Cage's "Dic-tum" had to be put into operation—new seedlings were deemed to be of greater potential worth than some of the parent plants. I found great pleasure as I reviewed the year and put it to practice.

## SECTION 1

(1) *Amaryllis papilio* (syn.—*A. argilagae* "Red Cohuna"); (2) *Amaryllis petiolata* (Pax) Traub & Uphof (syn.—*A. flammigera*); (3) *Amaryllis fosteri*; and (4) Dudley's *Amaryllis reginae* L.

## AMARYLLIS PAPILIO (SYN. A. ARGILAGAE;—"RED COHUNA")

When one has good things on hand, the blooming of new species does give a thrill to the grower and I also get one from others who write. Some years back, Dr. Ruppel sent a bulb of a new species, *Amaryllis Papilio* "Red Cohuna". I had to nurse it through some rough growth times. As I recall it was a smallish bulb and it had the cantankerous habit of trying to go dormant on me when I wanted to make it into an evergreen type. Eventually, I yielded to its habit from sheer frustration. Last Spring it bloomed.

I had expected something in the fiery red color range but it was not. What was unexpected was the twisting of the petals.

(2) *AMARYLLIS PETIOLATA* (PAX) TRAUB & UPHOLF  
(SYN.—*A. FLAMMIGERA*)

Another to bloom was Doran's collected form of *Amaryllis petiolata* (syn.—*A. flammigera*). *Amaryllis petiolata* makes a very large bulb with a large complement of heavy, thick, stout leaves that persist in an evergreen state and the whole bulb has to be subjected to a most rigid nonwatering schedule starting in October here to ripen-off the bulb so that it'll bloom in the coming Spring. The size of the bulb shrank down heavily when it bloomed. Three scapes shot-up with those near the center first but it was the one near the outside which split the tunics and bulb scales, which hustled itself into bloom first. As with "Red Cochuna", I was rather unprepared for the dazzling display of twisted segs of scarlet-yellowish color.

(3) *AMARYLLIS FOSTERI* TRAUB

The third species to bloom for me for the first time was *Amaryllis fosteri* from a beautiful big bulb from MARCIA'S. This, too, is an exotic beauty which has an up-and-out thrust of its long stamens. There were but six blooms and the bloomstalk was much shorter than commonly given. *The blooms lasted for weeks* in good shape. Only two were pollinated as the bulb was bare without leaves which caused me to hesitate to overburden a mere bloomstalk to prepare all the food needed to set the two seedpods. As it was, all the bulb scales outside the bloomstalk quickly ripened-off and it took about five months for the new leaf growth to start-up again with a flush of three leaves which are decidedly on the short side. For those who like flowers with style of all of their own, this species has it. For those who have been flowering it, I have not heard of anyone not happy with it. To those who have a letter writing friend who has been flowering Len Doran's hybrids with it, they know of the riches that Len Doran has uncovered in using it as a parent in primary hybrids. I have but a single one of these hybrids of his, *Amaryllis fosteri* x *Amaryllis brasiliensis* in a small offset. Since this hybrid has received rave notices by those who have bloomed it, one can duplicate a sure cross but one should keep in mind to give due thanks to the man who led the way, bloomed, and sent-out blooming stock of it. Thanks are due where credit is due. Since I have not read nor heard of the hybrid-cross: *Amaryllis fosteri* x *Amaryllis vittata* #1307 which, again, is a species re-collected by Len Doran. There were, at the start, twelve tiny seedlings which I watch closely as the bloom color of #1307 came noted as "absolutely gorgeous in its 'first' bloom for me—*Alejaría Crimosn veining inside* the long graceful trumpet, which seems almost solid in coloration; back of petals white with green keeling on midrib. The flower lasts a very short time—started opening on Monday and closed today—Friday; its only defect. Seems to bloom when leaves are a little 'floppy' from winter dor-



mancy. But it is "Very beautiful." I quote from Professor Doug Craft's letter. MARCIA'S in her offering lists this as having cardinal red markings but as Professor Craft is an artist, he undoubtedly has appraised its color from an artist's viewpoint.

Last year, a seedset was obtained with *A. vittata* #1307 onto *Amaryllis traubi* (not *T. f. dorianiana*) which are proving-out to be rather difficult growers. Even though the monocot leaf on the *A. fosteri* x #1307 *vittata* were thread slender, apparently this cross has more vigor than the above cross. One looks for a wide-open bloom with brilliant colors and a shock of prominent stamens to set it off with perhaps perfume to boot. But sometimes everything works on another scheme as seen in the hybrid "Harshshiana".

#### (4) DUDLEY'S AMARYLLIS REGINAE L.

A fourth species, *Amaryllis reginae* L. was outstandingly beautiful. I had not known that these were the same plant as those from USDA, otherwise I would have believed that a finer clone had been found. While the bloom was several months later than its usual Christmas time bloom and/or budding period, this growing area was to be treated to an "open Winter" in that there was a decidedly less amount not only of snowy days but also there was less of the blizzardy day-darkening winds which gave us much more sunshine and a lot less wind chill to creep-in around the window frames. *Amaryllis* "Dudley's Belladonna" loved this extra sunshine and responded to it. The nomenclature on this collection first known as "Dudley's Belladonna" mixed up at first, it was identified as a Belladonna and given the name "Dudley's" to note that there was doubt, then it was identified as "*Amaryllis miniata*" mainly on the West Coast. The USDA finally identified it as *Amaryllis reginae* L. from Peru. My plant for it, received from the United States Department of Agriculture (National Herbarium, Washington, D.C.), is the most beautifully grown *Amaryllis* that I have ever seen.

#### SECTION 2

##### A NEW SEXUAL METHOD FOR PROPAGATING AMARYLLIS?

Commonly *Amaryllis* reproduce themselves through seed production, offsets from the basalplate areas, splitting (it does happen at the maingrowing point), rhizome growths and the cuttage methods and with some species producing offsets on their bulb scapes. For the highly skilled, there is the meristem method which is a special type of cuttage method. But to those who enjoy the curious, you may wish to start to look-over your rootbound *Amaryllis* pots as it has been found that the *Amaryllis* hybrid: *Amaryllis papilio* x *Amaryllis espiritensis* has produced on its long, heavy, stout main-roots near the terminal end root-callous cells which remind one of naked *Gladiolus* bulblets. Growth starts from the sides of these and one or two *Amaryllis* bulblets with their leaf growth start a new plant which is vigorous. When I realized that *Amaryllis* could reproduce from "Cormallike

bulblets", I decided that someone else must be a witness to this news. I boxed the whole works up and mailed it down to MARCIA'S for further study there. In the energy-thrust to get things going, I failed to keep any for myself and nor did I take a specimen to send to Dr. Traub. I'm really not at a loss as I have three tiny seedlings from a sibcross which should help to determine whether this characteristic is inheritable or whether it is caused by growing conditions. There was such a tight root mass in the large clay pot which had been broken by root pressure, and further so tightly jammed in its hanger pot, that I had to take it outdoors and smash the works on the cement stoop.

To those who may wish to try to duplicate this as an experiment, *Amaryllis papilio* was received from a Dr. Ruppel, and the *Amaryllis espiritensis* pollen was from Boutin's clone which is more orange than pink in color. I find most *Amaryllis espiritensis* hard to grow but this particular cross was a rambunctious grower and one of the clones on its first bloom time had the flattest flowers that I've seen in *Amaryllis*.

### SECTION 3

#### SEVERAL INTERESTING HYBRIDS WHICH HAVE RECENTLY BLOOMED

There is that old saw: The difficult we do immediately, the impossible takes a little longer. The flowering of some *Amaryllis* fall into these categories. Such was the Sterling S. Harshbarger's hybrid: "Harshshiana" which took something like 11 years plus to bloom. But what a surprise it turned out to be! Rather unlike any other hybrid which I have bloomed. It is a cross of *Amaryllis fragrantissima* onto a form of *Amaryllis aulica*. The variables amongst these two species promised enormous possible variations. But the hybrid failed to conform to its outward possibilities but instead gave a wholly unlikely bloom which was highly tailored in utter simplicity. For the bloom was a simple tube with the tips turned back to reveal a stunning rose-red, wide picotee band around the pure white central portion of each seg. Wholly unexpected, it sent the mind racing along thought paths which could only recall a photo of Doran's species of similar form but in greenest of the greens. The bulb makes its new growth cycle in August and blooms towards the end of its growth period. Four offsets have been sent-out over the years but only Dr. Bell has reported that his bulb made a flush of 12 leaves which was several years ago. It may have a future in the breeding of wide banded picotees. Or in tube-type blooms if they become an acceptable bloom form sometime in the future. Mr. Harshbarger gave us a real stunner in this hybrid. Then, too, there are many forms of *Amaryllis aulica* and who knows what they may promise.

In the Spring of 1978, a cross was made with *Amaryllis traubii* x *Amaryllis reginae* L., from which seven seedlings were planted in a community pot and left there until they bloomed. Four seedlings have bloomed here. This is lot #1SX5-30-78RHM. The first seedling to bloom which during the daylight hours is a lovely tangerine, in artificial light, it takes on a

lovely pink glow-color. The second to bloom gets in its inheritance from "Dudley's *A. reginae* L.," displays its petals in a somewhat twisted stringy manner in an offshade of "pink" which is quite jarring. The 3rd to bloom had no particularly interesting characteristics to write about or to even remember it by. But 4 had a bloom which was divided evenly between the upper 3 segs and the lower 3 segs into 2 different color patterns of much darker above and much lighter in the lower 3 segs. This was surprisingly pleasing in looks which in fact, I found to be possibly better than the commonplace forms of  $\frac{1}{3}$  lighter in the lowermost segs. It gives a somewhat "Pansy-look" to the bloom face. After the bloom season had ended, it occurred to me that I should have attempted selfing with this last sibling to try to "set" this new color pattern. Many seeds were sent-out of this cross, only Doug Craft wrote-back about them and he was rather pleased with a particularly lovely pink form which had bloomed in a friend's potful of gift seedlings from him. I wish to test it further and gave it a much larger pot all of its own to multiply in.

## SECTION 4

## ON VARIOUS YELLOWS AND SOME IDEAS ON GROWTH.

One of the perennial favorite pursuits has been for the yellows, and particularly the elusive deep yellow since the day that Len Doran sent seeds of *Amaryllis evansiae*. They grew modestly well and bloomed in less than 24 months and promptly became difficult and dwindled away. Later Dr. Bell and I were to make acquaintance and he sent many of his choicest hybrids which grew like weeds in the Miami area but these have all been hard to grow up here. About the only place that these will even maintain themselves and put-on a mite of growth is in the upstairs in a West window where the light (surprisingly) is in a steady-state sort as on a North window as there are trees which filter-out much of the brightness of the summer's sun. The temperature is rather on the warm side all summer and a decidedly chilly cool all through the winter.

As other things are moved-out and/or rogued-out, other surviving near-pure *A. evansiae* will be moved-in to continue their growth. Some of Dr. Bell's hybrids do grow in more light such as his "Windowsill Hybrids" which is based on the 'Korsakoff *A. evansiae* Hybrids' pollinated by Dr. Bell's hybrid: *evansiae* x 'Mrs. Garfield'. Bell's hybrid number for this is #77-42. But several bulbs in this pot have unsteady growth patterns and none have bloomed yet.

In the same year he sent seeds of his #77-57 which is a complex hybrid of [(*Evansiae* x (*EA/E* x *Parodii*) X *fosteri*.] The notes say that I started off with 15 seedlings but at this time there are two lovely growing clones with another bulb which has been totally dormant for over a year. As I recall, his use of *Amaryllis fosteri* was to increase the flower count per bloom umbel. As *Amaryllis fosteri* tends to give hybrids in rich pinks, rose and red shades, the siblings must needs to be pollinated amongst themselves

until yellow dominates and THE EXTRA FLOWER COUNT PREVAILS.

There's another pot of Bell's hybrids which are smaller than any of its parents, which number 3, is Bell's hybrid #78-10. His notes give it as (*Ev.* x *Cy.*) X (*Ev.* x *Iqu.*) and their blossom form probably would be either as "stella" or as "spiderform" blooms and would be in the green-yellow-red stripe pattern. *Amaryllis cybister* probably would increase the bloom count. These three pots have filtered light with little actual sun as they grow under the shelter of a large *Hibiscus* tree which gives a more steady-state light level for a longer growing season.

Another yellow is in an *Amaryllis evansiae* from Miss Caryn Ecker, who sent me what she had labeled as "*evansiea*: good yellow form" in June 1979 which slowly and steadily has been making more bulb size and even spurred a bit last year in splitting-off a small offset. She did not include accession data nor its source. It has not matured into a blooming bulb as yet. This, too, was taken upstairs where it is doing much better than when it was downstairs. Occasionally, these leaf tips on these upstairs plants are nipt by the fresh-air coming through the window vent but the room itself has never frozen, yet.

Then there is 'Mrs. Sosa' which deserves mentioning. I first heard of this through correspondence with Dr. Ruppel when he had found it growing in a garden in Northern Argentina. This is a yellow trumpet species which has found its way into "yellow hybridizing". There are 2 pots of seedlings growing here both from the workshop of Dr. Bell. The 1st is his #79-38 which is '*Mrs. Sosa*' x *Amaryllis vittata tweediana* f. *Card.* which is a better grower than the other cross as *A. vittata* imparts robustness to many of its offspring. The other pot of seedlings is his #79-34 which is *Korsakoff's Evansiae* x '*Mrs Sosa*' X *EA*. It should be noted here that in *Korsakoff's evansiae* that Alex and Meta selected for size, *yellowness* and in some cases for "spiderform" . . . . A superior lot.

With the seeds from Dr. Bell came this short note: "These 'Mrs. Sosa' are from one bulb I received from Carlos (Gomez Ruppel) 4 or 5 years ago—I understand it is mentioned somewhere in PLANT LIFE—but cannot find it—Do you know anything about 'Mrs. Sosa'?? Marcia Wilson flowered Doran's #1315—and sent me a rather detailed description of it—a miniature *A. parodii* with a more intense yellow and green—and that is just how I'd describe 'Mrs. Sosa'!" In the pot here, only 1 clone is putting-on much growth and this is still extremely slow by any standard. It has been moved to the upstairs where it may do better growth in the West end window. As this clone has the best of pure yellow "inputs", it behooves me to pamper it best as I can. The one which has made any size at all has an *Amaryllis* "*Yanellosan*" type bulb tunic cover.

The Charles D. Cothran yellow hybrids have been tempered by having *Amaryllis striata* (through 'Senorita') and a Dutch White *Amaryllis* in their breeding and by selections by Cothran so that they are naturally good



growers. His aim has been headed towards a good yellow in a Dutch type hybrid which requires good grower parents to get the required bulb size to put forth the bloom size. Every Spring I am highly thankful to Sterling Harshbarger for sending me a small offset of Cothran's #339-17 which is still my favorite yellow. Unfortunately, it is almost sterile although I do have a single cross from it by Dr. Bell's best diploid *A. evansiae*. Two seedlings survive, 1 has a peanut size bulb and the other has bloomed for years with 2 bloom stalks each year. There has been an increment of yellow and a cleanness of coloring although the form has suffered to lapse into the *A. evansiae* form. It has the added virtue of *increasing its yellowness as the bloom ages rather than fading*. I consider myself lucky to have a Cothran's newest series of 'Yellow Pioneer' in bloom whilst this was and got a seed set and have a community pot of 9 surviving seedlings which should give plenty of chances to show their "bloom power" in yellow as to whether there has been a continued improvement. Dee Cothran has continued to hybridize so that there will be continuous improvements in the Dutch type yellows. We need his type to keep a pattern of quality before us. Then there are those who work with the pure species to reach the goal of the deep yellow; THEN breed to other pure species to get the wide flat form. But I am mainly concerned to reach the rich yellow so that neither form nor purity of species has been a hindrance. I do have a fine genetic pool and it must needs be added another which may tip the color scale to *a richer yellow*. WE HAVE YELLOW, WE NEED TO ENRICH IT. In 1980 on the 16th of June, I received an important seed packet for MARCIA'S which may hold an improvement in the yellow-gene-pool with her hybrid: *Doran's 4-flowered small Dresden yellow X Amaryllis aglaiae*. Doran's 4-flowered small Dresden yellow is probably something like *EA/E x parodii*, which such cross I had at one-time, but it just "petered-out" before the upstairs window came into use. These were lusty growers last year and have turned to be super lusty growers in a couple of the clones in the pot. Two super lusty, 1 midling, 2 so-so, and 1 runt but in some other growing environment the individuals just might thrive. This was under grow lights but now have to be moved as they were drowning-out the light to the smaller seedling pots. Lusty growers in yellow *Amaryllis* are rare and these will add new blood in the good growers in Cothran's line.

## SECTION 5

ON VARIETY IN A PLANT COLLECTION—*TACITUS BELLUS*

I am always suggesting to any plant grower who specializes in just one or two species to "lard-in" a few other unrelated plants so as to gloss-over those barren times which do happen and to WHET mental appetite with other good things. For it is a good antidote against the loss of interest when disease may wreak havoc or a bug may overwhelm a whole specialized collection. A few interesting survivors can help hold things together until the

mind can arm itself to take-after the problem and clean-up the plants again. I have a lot of these special plants which do not take any of the best growing spots from the *Amaryllis* but yet they provide a large share of the interest in growing plants. Whether *Begonia*, *Seemannia*, *cactus*, African violet, *Hoyia* or whatsoever, there are times when these come to the fore and give unstinted pleasure.

One of these is *Seemannia tacitus bellus* which is from Northern Mexico but does well in pots up here. It is barely light frost hardy in California. This plant looks much like an *Aeonium* but in bloom it suggests the best of rich reddish-pink *Sedum* blooms. Although a desert plant, it responds well to good "living" and can take much moisture so long as *the drainage is good*. This year I discovered a new characteristic about this plant. New bloom stalks come from the central growing point with the last of the series to be the 1st to bloom; BUT THIS year some of these bloom stalks kept right on growing and have become branches and failed to bloom. The plant makes myriads of offsets at the rear at leaf junctures, but those take a year or more after being severed-off to make a colorful separate plant. A leaf if removed and placed on damp moss will sprout roots and yield a number of plantlets to be severed and planted-out to mature. The bloom stalk seemingly dies at the main stalk as the first blooms open and let the tuft of leaves keep the blooms coming until blooming is finished. Fred Boutin sent this.

#### SECTION 6

##### ON VEGETABLES, BUTTE RUSSET POTATO AND AN *ALLIUM LILY*

I love to "vegetable garden" and practically live out there during the few short hours from work. Of course, the weeds make it imperative that I be there anyway, and give me a conscious excuse for neglecting much else. But this year, two vegetables were the show spot, not the *Amaryllids*, although each in its time was lovely.

In 1980, I bought the smallest lot of seed potatoes from Gurney's to multiply them for crop use. So with a fair sized seed stock, a broadly based trench was dug, fertilized with bagged compost and with an all-purpose general fertilizer, some soil thrown on to keep the seed potatoes out of contact with the fertilizers and then rather thickly planted. This was in March when early potatoes are planted here but something like 6 weeks later when the young growth had gotten as wide as a dinner plate at ground level, several hard freezes, which froze solid ice, killed all back. They were slow to recover and when they did, they made many shoots and quickly branched to over a yard across. Shortly thereafter they budded and started to bloom with a number of bud-clusters to each stalk until the whole row was a cloud of bloom which lasted well over a month. A dry spell hit at this time and hurt the potato-set although a fair crop resulted. These were lovely enough to enhance any flower border.

The other vegetable is a lovely *Allium* which is eaten as a fresh onion in this area. It cannot be a commercial bulb as it lacks any "bulb" but only a

fleshy rootstalk and is partially evergreen. For an *Allium*, it is a real beauty as the bloom cluster resembles *Agapanthus* from a short distance. They are bluish but variable with the soil that they grow in. The leaves are what the English would call an architectural plant which a steel engraving artist would relish to immortalize. There are six seeds to the seedpod and the leaves are flat with a bluish sheen to them.

SECTION 7  
ON CORRESPONDENCE

Probably one of the few things which can help put the gleam in the eye is an interesting letter on gardening and *Amaryllis* collecting. How the interest did perk up when a letter was received saying that an *Amaryllis* collection, a "shocking pink" *Amaryllis belladonna* had been found. I know that only a few of these exist. This brings up the problem of the distribution of these rare items. Frankly, there is not much that can be done as the "crop" is short—the demand is heavy. Further, those who have these have already made arrangements for what little surplus that there may be. Furthermore, some folks hoard them as rarities and choose not to share. Some folks just do not care about other folks. Some of these honest-to-goodness dealers are overworking themselves trying to accommodate their clientele. As a good rule of the thumb, do not try to exact more from your source than you need to accommodate the members of the *Amaryllis Society*. If you have been truly that good of a fellow or sister, undoubtedly, someone will have sung your praises in your sources' ears and they will have an eye and ear for your needs before you request them.

Your source deals with Universities, professional breeders, herbariums and the like who must be accommodated FIRST for often they will exchange a surplus which they have for a single rarity. They hold the key to many good things and far more folks can be supplied by that route than by a mere individual. If you are in the *Amaryllis Society*, one should be in it for as much as one can give (and maybe more so) than one gets out of it. LEARN to wait your turn, it is good manners even in a commercial world as well. I have literally hungered for *Amaryllis henryae* since shortly after Dr. Traub's AMARYLLIS MANUAL came out. That was 23 years ago, the pangs of "love" for that lovely *Amaryllis* are still there but it has spurred on an interest in other hybrids whether my own or others and use it for a test of worthwhileness of those that do bloom.

Some folks do not actually know the heavy load that being a good fellow entails. I can recall that Len Doran wrote that he had packaged-up well over 100 items of seed packets that day and also he included a newsy letter, labeled seeds and in some included additional information. Sharing, as Len Doran has, can be hard work and also VERY EXPENSIVE in time and money. Besides, whether Doran, Gomez, Boutin, Bennett, Howard, Wilson, Whitaker, Bell and others as prime collectors, they have had to hold down a full time job as well to make a living.

In *Amaryllis*, it is strictly a Mom & Pop operation, so please do not load them down with *pages* of detailed "required info" from them. There are botanical journals available (in English) all the way from Norway to PLANT LIFE in La Jolla, California. I still have not recovered from the Norwegian Journal's handling of *Haemanthus* (it is a lively Journal).

I did get a letter (today) which brought me up short for not rightly qualifying a written statement in the 1981 PLANT LIFE, p. 134, next to the bottom line. I should have written that the myriad hybrids given species rank in earlier studies were now reduced down to the two primary species of *Iris fulva* and *Iris hexogona* var. *giganti-caerulea*. I meant to imply that those were the ones reduced NOT THAT THERE WERE NOW only two species there. Other species and their hybrids are not given in this study; but just *Iris fulva* and *Iris hexogona* var. *giganti-caerulea*. In other past literature, many, many of these hybrids had been given specific rank but this is one of the best examples of Introggressive Hybridization AS MANY OF THESE "SO CALLED" SPECIES CAN BE READILY REDUPLICATED in the first or second generation of seedlings between these two species. I want to thank Dr. Richard C. Bell for writing and trust that this may clear-up the confusion about failing to give the two species names.

Do write and if you get letters, you may be cementing friendships many years a-coming.

## THE BIRTH OF AN AMARYLLIS ENTHUSIAST

RICHARD L. BEAUDOIN, *P.O. Box 395,*  
*Victoriaville, Quebec, Canada G6P-6T2*

Being an *Amaryllis* enthusiast for less than two years, I haven't made any great discoveries. In fact, my main purpose is to collect enough information about these lovely plants to persuade people around here to grow *Amaryllis*. I am searching for the easiest ways to take care of them under average house conditions.

### PERFORMANCE OF AMARYLLIS HYBRIDS

After a period of roughly two months dormancy with temperature between 40 to 50 F., I put the pots on top of apartment radiators at the end of October. From the beginning of January until mid-February 38 mature bulbs produced 46 scapes bearing a total of 181 beautiful flowers. Although 'Apple Blossom' was a winner, 'Martine' and 'Fantastica' were among the most praised. Three scapes aborted. These bulbs produced 17 offsets [one alone having 9 bulblets.]

Last summer, I kept the plants outside from the end of June until mid-September. But that didn't seem to improve their performance; too much rain, wind, diseases and insects and not enough sunny days, were en-



countered.

Last spring, I put some seeds I had collected afloat on tap water and some others in pure sand. After about six months, plants from both starters, had reached the same size. Now about a year old, the best growers had developed leaves 50 cm, and up to 5 leaves; but the latter are very narrow [not more than 2.5 cm].

Another trial which has been rewarding to me was to remove all the decayed roots on the plate of one sick bulb, brush it with Rootone, and re-plant it the usual way. This was done in mid-October and by the end of February this bulb bloomed nicely.

One of the worst problems in the "north" is the poor lighting conditions. Once I had a bulb bearing two leaves which were falling because of the weakness at their bottom. So I put the plant under artificial light for a few days and it regained strength. But I don't want to do so on an extensive scale because most people who like plants cannot afford a greenhouse or special lighting systems.

#### PERFORMANCE OF AMARYLLIS SPECIES

In May '81, I received bulbs of *Amaryllis* species from Marcia's [whom I want to thank for her help, guidance and kindness].

The soil formula I used was 80% pure sand, 20% peat moss, one tablespoon superphosphate for each gallon of mix, and enough Dolomite Lime to bring the Ph to 0.7. I also added a pinch of Osmocote. On the matter of watering, I was and I remain very liberal.

All these bulbs began to develop leaves slowly but without any noticeable problems up to now. I did not put them outside this summer and they kept growing leaves from the time they were put in soil without showing any sign of dormancy. By now, *Amaryllis evansiae* has developed a stem of about 13 cm high and about the size of a pen. So I should see my first species flower soon!

*Amaryllis belladonna* #1404; 8 leaves from 15 to 60 cm; one offset with 2 leaves. Two others offsets of this one potted separately at the same time are doing fine. *A. belladonna* semiplena; 6 leaves from 15 to 35 cm; has produced 3 offsets, one coming from the neck of the mother-bulb. Among the two other offsets of that one planted separately at the same time, one is doing fine, the other died.

*Amaryllis cybister* grows slowly but is in good condition. *A. evansiae* has four leaves and a scape is now [March 3] 13 cm long but not more in diameter than a pencil. *A. petiolata* (*A. flammingera*) 6 leaves up to 35 cm; has made 2 offsets which have been planted separately but never began to grow. *A. reginae*; grows nicely; leaves up to 50 cm; has developed 2 offsets which are growing rapidly [the 4" plastic pot is so crowded that it is distorted] The tip of a scape appeared [March, 3]. *A. striata*; leaves up to 50 cm; the offset I had collected started but failed to grow.

## AMARYLLIS FROM SEEDS

On May '81, I also received some seeds from Marcia's. Although Evansia/Striata (Senorita repeat) did not survive when transplanted from afloat in water to growing medium, the others grown like this:

*Amaryllis fosteri*; (out of 7 seeds); 6 plants, with 2 and 3 leaves up to 10 cm long, about 0.3 cm wide; Fosteri/Traubi; (out of 7 seeds); 6 plants, 5 with 2 leaves, 1 having 3, up to 12 cm long, about 0.5 cm large; Fosteri/Traubi, form. Doriana; (out of 9 seeds); 6 plants, 1 to 3 leaves up to 15 cm long, about 0.5 cm wide.

This report was taken on March 3, 1982. Sure, I am not breaking any record considering the poor lighting conditions here. I believe that I did not give them sufficient fertilization; only a pinch of Oscomote when transplanted, and in February one teaspoon of Oscomote to each 4" pot, which did not show much. Any suggestions will be welcomed.



Fig. 27. Dwarf West Indies *Crinum* species grown under nutrient solution swamp culture.

## DWARF WEST INDIES *CRINUM* SP., UNDER SWAMP CULTURES

HAMILTON P. TRAUB

In 1979, Marcia C. Wilson kindly sent to the writer, a small bulb of a dwarf West Indies *Crinum* species. It was given swamp culture, using a solution, nine drops to a quart of tap water, of "Schultz Instant" liquid plant food. It thrived, and bloomed in 1981 as shown in Figure 27.

### THE MARKET PLACE

(Under this heading, the names and addresses of those who have Amaryllids for sale, retail or wholesale, and brief notes on items for sale, will be listed *when information is sent to the Editor.*)

RUS-EN-VREDE KWEKERY NURSERY, P.O. Box 231, Constantia, R. South Africa 7848. Seeds and bulbs of Amaryllidaceae: *Ammocharis*, *Boophone*, *Brunsvigia*, *Cyrtanthus*, *Hessea*, *Nerine*, *Hemanthus* (including the synonym, *Scadoxus*). *Lachenalia*, *Agapanthus*, *Galtonia*, *Gladiolus*, and other bulbous plants. *Proteaceae*, *Leucadendron*, *Dias* (orchid), etc.

MARCIA'S AMARYLLIDACEAE, Proprietor, Mrs. Marcia C. Wilson, 255 Galveston Road, Brownsville, Texas 78521. Phone 512—541-2142. The 1979 Catalog was received and includes an extensive listing of *Amaryllis* species and hybrids; *Ammocharis*; *Crinum* species and hybrids; *Clivias*, *Cyrtanthus*; *Urceolina* (*Eucharis*), *Hymenocallis*, etc., etc.

SUDBURY LABORATORY, Sudbury, Mass. 01776. Royal Dutch Hybrid *Amaryllis*, and soil testing equipment.

RANDELL K. BENNETT, P.O. Box 305, Sierra Madre, Calif. 91024: has a limited quantity of *Clivia gardenii* for sale, and will have *Clivia caulescens*, *C. nobliis*, *C. miniata* and *C. cyrtanthiflora* for sale, and possibly other amaryllids in the future.

SCHULTZ COMPANY, 11730 Northline, Maryland Heights, St. Louis, Missouri 63043. Schultz Instant 10-15-10 Liquid plant food.

MISS CASYN B. ECKER, Meadow Place, Carmel Valley, Calif. is interested in trading or selling seeds and offsets of rare *Amaryllis* species.

MR. JOHN GERAGHTY, 94 Avondale Road, South Croydon, Surrey, CR2 6JB, ENGLAND, writes that he has for sale the *Crinum* species listed below. They are all of flowering size from the winter of 1979. Price list will be sent upon receipt of 2 international reply coupons *C. amoenum*; *C. angustifolium*; *C. asiaticum*; *C. brachynema*; *C. bulbispermum*; *C. defixum*; *C. flaccidum*; *C. latifolium*; *C. longiflorum*; *C. macowani*; *C. moorei*;

*C. pedunculatum*; *C. pratense*; *C. thaianum*; *C. woodrowi*; *C. zeylanicum*.

ECONOMY LABEL SALES CO., INC., P.O. Box 350, Daytona Beach, Fla. 32015. Complete line of plant labels.

NERLINE NURSERIES, Welland, near Malvern, Worcestershireshire WR13 6LN, England. Autumn catalogue, August 1980, including *new species for 1980*, and standard cultivated named clones. New species: have all but one of the 30 named species, including the new *N. hirsuta* (Gordon McNeil), which is the first *Nerine* to flower each year during the flowering season from June to February (nine months), and *N. platypetala* (1971); *N. gibsonii* (white flowering, from the Transkei) is offered for the first time.

#### CRINUM AND ZEPHYRANTHES CLONES

Introduced by Marcia Wilson; continued from page 58

*Crinum* clone 'William Herbert' (Howard, 1981); Scape height is 2½ feet, flower size 10½ inches and length 12 inches. Flower is immense with segs both 6 inches long and 13¼ inches wide in overlapping, flat-faced form. Bright red keels and midrib with red freckling over white margins. Excellent substance and fragrance, amber pollen. Medium sized evergreen plant from cross of *C. scabrum* x *C. X'Ollene*.' (See page 82.)



Fig. 28. Outstanding hybrid *Zephyranthes* 'Capricorn', bicolor of yellow and burnt orange; produced by Dr. Thad M. Howard. See page 80.

*Zephyranthes* clone 'Capricorn' (Howard, 1981); scape height is 7 inches, flower size 2¼ inches with ½ inch petal width and occasionally 7-10 rather than normal 6 petals. Color is Burnt Orange (HCC Brick Red) with a yellow center. Semi evergreen, vigorous, blooms and offsets well, and is fertile both ways. Cross of two unnamed hybrids; introduced in 1981. (See page 92.)



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[111]

## 1981 MEXICAN PLANT EXPLORATION TRIP

T. M. HOWARD

As long feared, the situation regarding much of the rare plant material for which Mexico was so richly endowed is worsening. Overgrazing and destruction of habitat continue to be the primary causes of reduction of Amaryllid and other bulbous populations all over the country. Cattle and donkeys do much of the overgrazing, but the single worst offender is the goat, particularly in dryer areas. Destruction of habitat is due mainly from cultivation, and much of it is done by the slash-and-burn method. This method does little harm to bulbous plants but it does get trees, giant cacti, and the orchids and bromeliads found upon them. Overgrazing and plowing get the bulbs.

In Oaxaca, once especially rich in bulb material, the situation seems as bad as elsewhere. An entire population of *Crinum cruentum* has been destroyed, as have large populations of *Hymenocallis baumlilii*, and an undescribed *Hymenocallis* species from Monte Albon. An undescribed red and yellow flowered *Polianthes* can not be found anymore, and a red and green *Polianthes* species is nearly extinct. A picture-card llano (mountain meadow) that once had a lovely colony of the lavender-blue *Tigridia seleriana* is now devoid of them from overgrazing. And so it goes.

An unusual colony of *Crinum cruentum* growing below a bend in the road in the mountains of Oaxaca have been ripped out by peasant women to be put into cultivation. Only a few years ago, it was a fabulous sight to see about an acre of the pinkish *Crinum* in flower. Now this same area alongside a stream is planted with undistinguished small *Gladioli*, *Montbretia*, *Daisys*, and *Agapanthus* for market cut flowers.

The most bizarre extermination in Oaxaca is directed at *Milla Oaxacana* by children. *Milla Oaxacana* is one of the nocturnal flowering Millas of central and Southern Mexico and has jasmine scented flowers that begin opening at sundown and close early in the morning, before dawn. By the time the sun has set, the flowers are all widely open and begin to emit their delightful perfume. This is particularly effective when the flowers are gathered into bunches. Children comb the countryside each day during the flowering season in July and August, gathering them into handfuls and armloads so that they can peddle them in the evenings in the City of Oaxaca, or hold them up to passing traffic on the roads entering the city. This scenario goes on, day after day, year after year, for the past several decades. The damage that has been done to *Milla oaxacana* populations is appalling, for the pressure is great. Once a common roadside plant, it is rapidly becoming rare. Individually, each flower lasts but two nights, remaining closed each day, with only a few hours of glory, between sunset and dawn. They are very short lived cut flowers. This same scenario is duplicated in

Mexico City, where *Milla biflora* is peddled in large bunches on street corners along the boulevards. In all fairness, *M. biflora* makes a much better cut flower, as the flowers remain open both day and night, and they are a bit larger. But their fragrance lacks the intensity of *M. oaxacana*. Luckily *M. biflora* has a much broader geographical range than does *M. oaxacana*, so is not a threatened species.

I have seen similar flower-picking applied to the fragrant white flowered *Polianthes* species that grows around northern Jalisco and adjacent Guanajuato, where they are known as “Nardos”. Ordinarily the loss of a small percent of any wild flowers flower stems might be only considered a harvest of sorts, but in the case of *Polianthes* species, it is a real danger to perpetuation of the species. Overgrazing and cultivation has restricted these populations to the narrow ribbons between the highways and barbed wire fences, and the floral “harvests” are intense, annual affairs for the peasant markets. Frequently the shallow bulbs are yanked up along with the flower stems. It is a wonder that any plants escape the pressures and have the chance to make any seed. In a very short time, *Polianthes* will be scarcer than Hen’s teeth.

In general, bulbs growing on land that can be grazed or cultivated are either gone, or on their way out. Those that grow in marshes fare much better, and so do those that are found on steep hillsides, on cliffs, and in steep rocky outcroppings. I don’t begrudge the cultivation so much as I do the overgrazing by livestock, especially goats and burros. The latter two can climb steep hills, crop everything in sight and are particularly destructive in proportion to what they give in return. Better range management could slow down the losses and improve better agricultural yields.

Not all the news is bad. In Veracruz we found a large naturalized colony of *Crinum zeylanicum* that had escaped from gardens and reseeded themselves along the sand dunes by the roadsides. They were a most impressive sight. In propagating themselves unhindered, by seeds, they had a chance to exhibit their genetic diversity and show many interesting and attractive forms not normally seen in cultivation. While this species is considered as belonging to the *Codonocrinum* Section, with funnel-shaped, trumpet, or chalice-shaped flowers, many of them bordered on *Platyaster* forms, with patent flowers opening nearly flat. Many had recurved tips. The common form has red exterior keels and a white interior with pale pink midribs. But this colony had many individuals with midribs striped as brightly as the keels, and moreover, some of these were striped an almost black-red, while others were merely striped pink. The richest and darkest red striped forms also had purplish-red stems to add to the color. Oddly, the pink striped forms were less robust than their darkly striped counterparts. The intermediate forms were most attractive and here the striping was more variable as were the flower forms. We collected a few bulbs that we had selected as being particularly attractive, with almost *Platyaster* floral form. Bulb sizes varied considerably in this colony, with the most robust forms

having the largest bulbs and the smaller forms producing fairly small bulbs in comparison. I really hated to bid goodby to this colony as I only spent enough time with it to barely tap its full potential. It was an education that could normally only be found in Africa, where it is native. Les Hannibal had often said that it was known to be quite variable in its native haunts, but I doubt that even he would have been prepared for what we saw in Veracruz. They were variable enough so that a novice might have thought that many of the variations were different species, with perhaps some hybrids thrown in for good measure, but when you can stand away from them and view them all at once, knowing full well that they are all seed-fertile, and are really all only one good thing, then, and only then, can you get the true picture. But any good field botanist knows that this is a normal situation in nature, where man does not interfere. When at its best, *C. zeylanicum* is every bit as colorful as *C. scabrum*.

*I can now add two more cultivated Crinums to the list being cultivated in Mexico. In Cuautla, Morelos, we found a fine planting of 'Cecil Houdyshel' in front of a large home near the downtown area. This shows that a small number of our USA Crinum hybrids have made their way into central Mexico. In Cosamaloapan, Veracruz, we found several large clumps of C. rattrayi planted by the roadside near a Volkswagon agency. Clumps were large but foliage appeared to be affected with mosaic virus. We hope that it was only the cultural conditions that gave it this appearance.*

Also while in the sandy dunes of Southern coastal Veracruz, the writer once again found the lovely lavender-blue *Alophia* species that I had not seen for many years. This species is similar in most respects to the purple *Alophia* species found in Texas and again in Chiapas, but the flowers are a shade smaller, and marked a bit differently. Most of these were a delicate lavender blue, but a few were pale enough to be an off-white. At the other extreme, there were some dark purple ones, but these still were quite different from our Texas purple species, so more than just a difference in color is involved. The Veracruz species is obviously a different species from the others.

In northern Oaxaca we searched for, and found, the rare little *Sprekelia* species with the tiny flowers and narrow glaucous leaves. Luck was with us and we were able to obtain a fairly large collection to share with Marcia C. Wilson so that eventually a few interested collectors may have a chance to grow one of the most interesting of the Mexican Amaryllids. Flowers are much miniaturized, with stems only about 6" high (more or less) and with floral segments only about 5 mm wide. The color is a pinkish brick-red. This species grows in northern Oaxaca and adjacent southern Puebla, and oddly enough, often in company with the larger common *Sprekelia*.

At Tepene, Puebla, which is no more than a spot in the road with a couple of houses, we looked for *Zephyranthes nelsonii* as the sun was going



down. There was not enough time to make a decent collection because of the dimming sunlight. I had collected here before at an earlier time when they were in flower almost twenty years ago, and found them in colors from pink to pure white. The flowers were surprisingly sweet scented, and the cells in the petals reflected a frosty sparkle. Not so this time. The blooming season was over, and we had to practically crawl, with our eyes to the ground, to find the slender grassy foliage in the dim light.

Late as it was becoming, we still managed to make one more collection before it got too dark. This time a new *Milla* species . . . one of the night-bloomers . . . growing on a ledge above the road. This particular *Milla* has been collected in the early sixties by the writer and perhaps will be published next year in PLANT LIFE. A smaller ally of *M. magnifica*, it is noteworthy in having erect, scabrous foliage, large night-flowering blossoms, robust habits, and increasing by long underground rhizomes. I dug a nice clump and that was the last collection for that day.

We made a point to dig bulbs of *Hymenocallis acutifolia* near a stream just outside of Jalapa, Veracruz. Jim Bauml and I had collected at this same spot in 1976. I still have a few bulbs from that collection, including seedlings, and it is my opinion that *H. acutifolia*, in its best forms, is perhaps the finest of the thirty or more *Hymenocallis* species for cultivation. What makes this species so outstanding is the fact that the staminal cup is larger than any of the others (6-7 cm wide), opens out very flat, and the umbel is large. Also, *H. acutifolia* is the very last species to flower each year, generally in August or September, but sometimes as late as October or even November. In my garden, the Texas *H. lirioides* is the first *Hymenocallis* to flower in the spring (March or April) and *H. acutifolia* closes the season nearly six months later in late summer and early fall. *H. acutifolia* is one of those unusual species of Mexican *Hymenocallis* in which the floral cup is adnate to the base of the segments. The closely related *H. riparia* is another. But *H. riparia* flowers months earlier in the summer, and has smaller staminal cups. It is possible that the species may overlap, and this could complicate matters. In general, if one finds a *Hymenocallis* flowering in marshes and streams in Central Mexico in July, you can be sure that it is *H. riparia*. And if one finds *Hymenocallis* in flower in similar habitat in Central Mexico in September, you can be certain it is *H. acutifolia*. But in August, one must be very careful, as either is apt to be in bloom . . . either the last of the *H. riparia*, or the earliest of the *H. acutifolia*. All else being equal, flowers of *H. riparia* are very attractive and showy, but those of *H. acutifolia* go beyond that. They are gorgeous. Luckily, the two species are for the most part, confined to different ranges. *H. riparia* prefers the Pacific states, beginning in Sinaloa, and extending down to Guerrero. It is to be found near fast moving streams, and in low wet meadows at moderate altitudes. The seeds do not float, and sink like lead to the bottom. This prevents them from washing away to the Pacific Ocean. Nature has a way in maintaining populations and keeping them "put". *H. acutifolia* behaves in

similar fashion, but we are more apt to find this species near streams that drain to the Gulf of Mexico, in Veracruz, Morelos, and Puebla. Farther south *H. acutifolia* breaks ranks in Oaxaca, and perhaps in Guerrero, and may be found near streams draining to the Pacific. But always, *H. acutifolia* is a late flowering *Hymenocallis*. In cultivation, *H. riparia* is almost foolproof. It is one of the easiest to grow and flower, and in my garden has even reseeded itself to form new colonies. It prefers a wet environment, but adjusts very well to very dry garden conditions and will survive where most other species would die for lack of adequate moisture. *H. acutifolia*, on the other hand, will die under dry conditions. It likes to be pampered with regular watering and fertilizing. *H. riparia* needs none of this. Foliage and habits are otherwise similar.

Heading home, I stopped in the State of San Luis Potosi to dig *Milla potosina*. This is a new night-blooming species allied to *M. oxacana*, but is endemic to the State of San Luis Potosi and bordering states. Flowers open at sunset and close before dawn. The sun was going down as I dug them, and they were suddenly popping open all over the place. This species seems to be in no danger from man or beast and is holding its own all over its habitat, no doubt due to the fact that it is a desert plant. It is often found in company with *Habranthus concolor*, and some of the other *Zephyranthes* with pink or white flowers, and an *Allium*.

## *ZEPHYRANTHES BRIQUETII* TRANSFERRED TO *MASTIGOSTYLA* (IRIDACEAE)

PIERFELICE RAVENNA

*Casilla 21128, Sucursal 21, Santiago, Chile*

### ABSTRACT

An examination of the phototype of *Zephyranthes briquetii* Macbr., disclosed that the species actually belongs in *Mastigostyla* Johnst., of the Iridaceae. The new combination *M. briquetii* (Macbr.) Rav., is established accordingly.

During current revisional studies in *Zephyranthes* and its allies, a photograph from the type-material of *Z. briquetii* Macbr., was requested from the Field Museum of Chicago. The species was based upon specimens collected by Weberbauer in the area of Carumas, dept. of Moquehua, Peru.

When the phototype reached my hands, a first-glance examination of the three mounted specimens in the sheet, revealed that they did not agree with *Zephyranthes*. In fact, the bulb type, short linear-attenuate *plaited* leaves, free slightly unequal spathe-valves, and the outer tepals distinctly much larger than the inner ones, were features that clearly corresponded to a rather familiar genus of my specialty: the genus *Mastigostyla* of the Iridaceae.

MASTIGOSTYLA BRIQUETII (MACBR.) RAV. *COMB. NOV.*

*Zephyranthes briquetii* Macbride, Field Mus. Publ. Bot. 11: 9, 1931.

Specimens: Perú, dept. Moquehua, Carumas, near Volcano Ticsani, 4000 m. with cushion and rosette plants; leg. Weberbauer 7322, 27/28-II-1925 (F type, not seen, phototype in Herb. Rav.).

It seems evident that Macbride made no dissection on the plants under consideration. Apart from the fact of overlooking the marked difference in size between outer and inner tepals, his description defines the filaments as "free", which contrariates the generic description of *Mastigostyla*.

In my collecting trips to north Argentina, Bolivia, and Perú, I paid special attention to this pretty genus. Bulbs of all the known species, and several new ones were digged, and plants studied alive and pressed from my experimental collection. As an advance, it must be said that additional new species are still waiting for publication.

## ACKNOWLEDGEMENTS

I feel obliged to the Botany staff of the Field Museum of Natural History, Chicago, for sending me the phototype of *Zephyranthes briquetii*.

---

## THE SUNFLOWER AS THE NATIONAL UNITED STATES FLOWER

Mr. Marc Askew, 1850 Kubel Circle, Sacramento, CA 95825, has drawn up a resolution (based upon research about the importance of the Sunflower, *Helianthus annuus*, as a food source and important ornamental—Anderson, *Plants, Man & Life*, Univ. Calif. Press, 1952; Heiser, *The Sunflower*, Univ. Okla. Press, 1976; and Beard, *The Sunflower Crop*, Scientific American, May 1981, pp. 150-161)—declaring this plant the National Flower of the United States. Those interested should write to Mr. Askew, and Congressman Robert L. Matsui, Cannon Bldg., Washington, D.C. 20515.





Fig. 29. The Desert Glory Lily, *Hesperocallis undulata* Asa Gray (1858), a "Living Fossil", relict. The only living representative of this evolutionary line, with the alliaceous scent and taste when tissues are bruised.

The correct placement of this relict under the Order *Alliales* (see Traub, 1968, 1970, 1972) after more than a century of uncertainty, demonstrates the usefulness of the biochemical approach in solving lineagic problems.

Photo courtesy Harry H. Hawaath, Pasadena, Calif.



## ORDER ALLIALES

HAMILTON P. TRAUB

## INTRODUCTION

It had long been known that laticifers are present in the tissues of *Allium* L. species (see Rendle, 1884, Menz. 1910, Hoffman, 1930, Mann, 1952, and others), but no attempts were made to determine the phylogenetic significance of this very unusual anatomical feature on a wider comparative basis in the one genus; also in relation to the other genera of the Family Alliaceae, and the other families assigned to the Order Liliales (Takhtajan, 1961, 1969; Cronquist, 1968, 1981).

For many years the writer did his best to interest graduate students in this fertile field of thesis material but there were no takers. Fortunately, out of the clear blue sky in 1967, Dr. Clarence Sterling of the Department of Food Science and Technology, University of California at Davis, wrote that he had a graduate student interested in studying the laticifers of *Allium* L. The writer took this opportunity to send not only bulbs of *Allium* L. species, but also to send stock of species in other genera of the Family Alliaceae, including *Caloscordum* Herb. (Eastern Siberia to Mongolia, China and Japan), *Nothoscordum* Kunth (U.S., Mexico and Chile), *Tristagma* Poepp. (Argentina), *Tulbaghia* L. (South Africa), and *Agapanthus* L'Herit. (South Africa), a selection which was calculated to give a wide-ranging insight into the phylogenetic significance of this unique anatomical feature, if present, on a comparative basis. The writer also suggested possible sources of *Hesperocallis* Asa Gray from southwestern United States; and species of *Leucocoryne* Lindl., from Chile, *Miersia* Lindl., from Chile and also *Brodiaea* J. E. Smith, and related genera, from the North American Pacific Coast, and *Milla* Cav., and related genera from Mexico. Due to time limitations, the graduate student, as noted below, found it practicable to include only the genera *Allium*, *Caloscordum*, *Nothoscordum*, *Tristagma* and *Tulbaghia*, but this was sufficient to set a landmark, and lay the foundation for progress in this field.

When the results were in, the editors of the American Journal of Botany published only the part concerning *Allium* L. (see Huang & Sterling, 1970). These are significant results in a number of directions. Previously Traub (1968a, 1968b) had recognized the subgenera *Amerallium* and *Allium* in the Genus *Allium* L. on the basis of chromosome number and the distribution of the vascular bundles in the leaves of *Allium* L. species. The validity of these conclusions was corroborated by Huang & Sterling (1970) on the basis of the depth at which the laticifers are located in the leaves of *Allium* species. The reader should consult the original article (Huang & Sterling, 1970) for more details about this subject, and other results obtained.

Since the results concerning the other genera—*Caloscordum*, *Nothoscordum*, *Tristagma*, and *Tulbaghia*—were not published, the writer as editor offered to publish these. They appear in the article by Sterling & Huang (1972) in PLANT LIFE. These show that laticifers are present in all of the genera investigated, ranging from the Northern Hemisphere to South America and South Africa, and reveal that the group is well-defined and unique on the basis of laticifer anatomy.

In the subfamily Allioideae as recognized up to the present (Traub, 1970), it is known that the alliaceous scent is present when the tissues are broken in *Hesperocallis undulata* and *Milula spicata*, and is widespread in the subfamily as a whole. In the Genus *Allium* L. apparently *A. nigrum* L. and several other species are without this scent, and similarly species of *Tulbaghia* L. have the alliaceous odor except *T. fragrans* Verd. Similar conditions are found in *Leucocoryne*, *Tristagma*, *Nothoscordum*, and species of the Tribe Gilliesieae. This leads to the conclusion that when this feature is lacking, it has been lost through evolution. Thus, on the basis of the presence of the alliaceous scent, this group is unique in the plant subkingdom.

In addition to the alliaceous scent, the presence of laticifers has now been shown to be widespread in the Family Alliaceae, a unique anatomical feature when considered in connection with the other families included under the Order Liliales up to the present. As pointed out by Eames (1961), in connection with the presence of laticifers in the Limnocharitaceae and Alismataceae, that such an important anatomical feature cannot be ignored when phylogenetic relationships are considered. Thus, it was necessary to recognize the Alliaceae as a very distinct group under the Order Alliales (Traub, 1974).

In the case of the Order Alliales it is not necessary to reconstruct a hypothetical first alliad because the Alliales include also the "living fossils" (see Traub, 1968b, 1970), the raceme bearing *Hesperocallis undulata* Asa Gray ( $2n = 48$ ), from the southwestern United States (Rountree, 1941; Traub, 1970), and the spicate *Milula spicata* Prain, ( $2n = ?$ ) from Tibet and Nepal (Prain, 1895, 1896, Stearn, 1960, Traub, 1963, 1970). Both have to be included in the Alliales due to the biochemical marker of the alliaceous scent when the tissues are broken, as well as some gross morphological features. These are relics apparently representing relatively primitive living descendants of the extinct primitive line from which the well-known species of the Alliaceae also evolved. These "living fossils" cannot be united with the more advanced Family Alliaceae and have to be recognized for what they are—distinct relict families, each having evolved in a different direction, and each with only a single surviving relict species. *Hesperocallis undulata* is apparently nearest to the extinct primitive line. The basal leaves plus *leafy stem*, and *racemose inflorescence* are relatively primitive. The line may even have continued from the original alliards *with evolution* in an unbroken sequence to *Hesperocallis undulata*. However, the bulbous rootstock, the perigone united below into a tube, stamens inserted at the throat, syncarpous ovary and capsule, are relatively advanced characters, showing con-

tinued parallel evolution along the later alliad pattern—similarities developed in two or more lineages of common ancestry, and on the basis of, or channeled by, the characteristics of that ancestry (Traub, 1964).

## CHAPTER 1

### THE ONION LILY ORDER—ORDER *ALLIALES* TRAUB (1972)

The Order *Liliales*, consisting of left overs after the obvious Order *Orchidales* was separated from it, remained a mixed lot of lines evolving in various directions, and is thus not a unified major order.

It should not have been too unexpected that such a distinct evolving line as the *Alliales*, characterized by the presence of *laticifers* and the *alliaceous* scent when the tissues are broken, should have been discovered sooner or later.

The Order *Alliales* is represented in the contemporary time frame by two *relict* families of “Living Fossils”, *Hesperocallaceae* and *Milulaceae*, and the Families *Alliaceae*, *Gilliesiaceae* and *Brodiaeeaceae*.

The present writer had adopted the study of the *Amaryllidaceae* as one of his avocations beginning in 1900 at the age of 10. If Dr. John Hutchinson (1934; 1959), of Kew had not taken the Tribe *Alliaceae* from the Order *Liliaceae*, and united it with the Family *Amaryllidaceae* as a subfamily on the basis of the presence of the common character of the *umbellate inflorescence*, he possibly would not have studied the *Alliaceae* in such detail, and would not have discerned that Hutchinson’s placement was artificial, and out of line, and have noted that his *Allieae* were in fact entitled to rank as an Order with the presence of definitive markers of the *alliaceous odor* when the tissues are broken, and the *presence of laticifers*, both characters widely present, except when these may have been lost in some species through further evolution.

The writer is indebted to Shui-mei Huang and Clarence Sterling (1970) who demonstrated the wider presence of laticifers in *Alliaceae* plants, from Eurasia, North Africa, North America, lower South America to South Africa, thus confirming the author’s original hypothesis.

#### HISTORICAL PERSPECTIVE

The overall relationships among the lily-like flora, Class *Liliida* of superclass *Monocotyidra* (Traub, 1972), have been somewhat neglected by the workers in this field because the morphological characters of some of the members, especially the *Alliales*, are not as distinctive as is the case in most other Classes of the Monocots. Outstanding distinctive characters are not readily apparent, and it is for this reason that these plants have been allowed to remain in an anomolous state of *terra incognita*. This is especially true of the Order *Alliales*.

*It must be admitted that evidence from gross morphology is still an important tool for use in grouping most organisms, but it is becoming ever*

more apparent that the researcher in lineagics has to consider also evidence from such other disciplines as *biochemistry*, *embryology*, *anatomy*, and so on. This is a necessity as shown in the case of the Class *Liliida* as a whole (Traub, 1972), and the Order *Liliales* in particular. Although the wholly morphological approach, pursued in the past, has yielded great dividends in many instances, it no longer suffices because the pay dirt has almost run out. Evidence from various other disciplines is required for resolving the more subtle distinctions that remain to be sought out by the contemporary worker.

1829-1967. Lindley (1830) placed the Alliaceae Link (1829) under his Tribe Asphodeleae., and he also recognized the separate Tribe *Gilliesieae*.

The name, Family *Alliaceae* Agarth (1858) has been conserved (Lanjou, et al. (1966). According to Willis (1897, 1966) this Family has been considered as intermediate between the *Liliaceae* and *Amaryllidaceae*, having the superior ovary of the former and the scapose umbellate inflorescence subtended by a spathe of bracts, of the latter.

With the appearance of the Englerian system, the group under consideration (Engler & Prantl, 1887, Melchior, ed. 1964) was assigned to the Order *Liliales*.

Since 1964. Takhtahjan (1968, 1969) and Cronquist (1969, 1981) have published phylogenetic systems involving the classification of flowering plants, the latter following the lead of the pioneer work of Charles E. Bessey (1945-1915). These phylogenetic systems have been widely adopted, including the 1972 *New Encyclopedia Britannica*. Traub (1974) has suggested a further revision with reference to the Order *Alliales*.

#### ORDER ALLIALES

Traub, *Plant Life* 28: 129-132. 1972; *New Encyclopedia Britannica*, Vol. 10, p. 979. 1974.

DIAGNOSIS: rootstock, a rhizome, bulb or corm; laticifers discovered in the species investigated so far; the alliaceous scent when tissues are broken wide spread, unless lost by evolution; inflorescence a raceme, a spike or an umbel; ovary superior; perigone 6-(rarely 5, or 3) parted; tepal-tube below; stamens 6, (or rarely 3 or 2); ovary tri-locular; fruit a tri-locular capsule; seeds usually numerous in each locule. Basic chromosome number  $x = 6$  ( $2n = 48$  in *Hesperocallis undulata* Asa Gray, the most primitive species in the Order.)



KEY TO THE FAMILIES OF ORDER ALLIALES

**1a.** Inflorescence a raceme; rootstock a tunicated bulb, flowers regular, 6-parted, united into a tepaltube below; tissues give off alliaceous scent when bruised (SE California; SW Arizona, and possibly NW Sonora, Mexico) . . . . . Family 1. **HESPEROCALLACEAE**  
(Chapter 2)

**1b.** Inflorescence a spike or an umbel:

**2a.** Inflorescence a spike, rootstock a tunicated bulb; flowers on spike tiny, 5-parted above, united into a tepaltube below; tissues give off alliaceous scent when bruised (Tibet and Nepal) Family 2. **MILULACEAE**  
(Chapter 2)

**2b.** Inflorescence an umbel:

**3a.** Rootstock usually a truncated bulb, sometimes rhizomatous; flowers usually regular, sometimes irregular; (Eurasia; North Africa, North America, southern South America, and South Africa) . . . . . Family 3. **ALLIACEAE**  
(Chapters 3-8)

**3b.** Rootstock usually rhizomatous or a tunicated bulb or a corm; or always a corm:

**4a.** Rootstock usually rhizomatous or a tunicated bulb or a corm; flowers usually markedly irregular; evolving from (regular) free tepals (2 genera), to tepal union below into a tepaltube; and from 6 tepalsegs to 5 or 3; from 6 to 3 or 2 fertile stamens; and from the entire to 3-parted stigma in some species, as a secondary line of change which appears to be more or less random (Chile, Argentina and Peru) . Family 4. **GILLIESIACEAE**  
(Chapter 9)

**4b.** Rootstock a corm; flowers regular; tepals free or united below into a tepaltube, tepalsegs above (United States: Calif., Ariz., New Mexico, Nevada, Utah, Colo., Texas, South Dakota, Washington, Oregon, Canada: British Columbia; Mexico to Guatemala) . . . . . Family 5. **BRODIAEACEAE**  
(Chapters 10 and 11)

CHAPTER 2  
“LIVING FOSSILS”

When returning by automobile from the Pacific Coast in 1945 to the U.S. Horticultural Station at Beltsville, Maryland, after having completed an assignment as Principal Physiologist to the Emergency Guayule Rubber Project during the Second World War, the writer collected along the road an *Allium* species (bulb with leaves and flower scape) in northeastern Nevada; which he brought back for identification to the greenhouse laboratory at the Beltsville, Maryland U.S. Horticultural Research Station.

This plant was placed in ordinary potting soil used at the Research Station. When the plant was again inspected a few weeks later, the top was still present, but the bulb had vanished without a trace. Apparently, the soil solution on the arid side of the pH scale dissolved the bulb tissues. Apparently with this species, the reaction of the soil has to be on the alkaline side to preserve the bulb tissue even temporarily. This explains the critical conditions under which the bulb scales of *Allium* species, and apparently also of other *Alliales*, might be preserved, and the lack of *Alliales* in the fossil record. Possibly *Alliales* pollen might be an exception.

Although there are no true fossils in this case, we are fortunate in having at least two “living fossils”—single species in two genera, *Hesperocallis undulata* Asa Gray (1868) and *Milula spicata* Prain (1895) in the Order *Alliales*. They represent evolutionary lines that have lost plasticity and are relegated to the Sonora Desert in southern California and Arizona, and possibly also in the Mexican State of Sonora, and the Himalaya highlands in Nepal and Tibet, respectively.

The present chapter is devoted to these “Living Fossils.”

THE DESERT GLORY LILY

The informative description (Rountree, 1941) on the most primitive of the “Living Fossils”, *Hesperocallis undulata* Asa Gray (1858), by Lester Rountree (1879-1979), is paraphrased as a fitting introduction to these little known plants, which are apparently unknown under cultivation.

“Even old timers are unable to predict a good *Desert Glory Lily* year. Numerous blooming plants with tall well flowered stems do not always follow a rainy winter. Last winter’s (1940) rains were record breaking but in April, when, after a year’s absence from California, I got back to some of my happy hunting grounds in the desert, I found *Hesperocallis undulata* puny and few-flowered. It may not be the amount of rain after all but the *time* when the rain comes, that affects the season’s growth and bloom of most of California native plants. In order to function at their best some of them must have the moisture just when they need it. If it is a winter deluge that produces bloom, last spring should have been a banner one for wild display. Instead, it brought a superb show of many species of flowering bulbs, while the performance of others, as well as many annuals and herbaceous perennial plants was barely normal.

“Like much other California vegetation, the *Desert Glory Lily* has a short and vigorous growing season. The leaves spear the desert floor in February. By early May every sign of life—stem, leaf and even seed pod—has vanished. Between its appearance and disappearance, a great deal has been accomplished in a short time. The narrow luminous basal leaves of iridescent blue-green, leathery, wavy and white-margined, lengthen to almost two feet, and arch to touch the earth with their points. The bluish flower stem thrusts erectly upwards to over eighteen inches. Buds form, expand into flowers and the flat seeds, packed tightly in rows, go jet black in their three-lobed subglobose capsules.

“Sometimes the stem has one or two side branches. The flowers on these expand concurrently with those on the main stem. Only a few blooms come out at a time and they follow no regular order of opening although the lower buds usually break first. Fifteen buds and flowers is a good average and on one or two plants I have counted sixty. The lovely flowers keep coming out during the day. One afternoon I watched five blooms, on the same raceme, expand on after another, all within an hour. If the stem is picked and not plunged, the flowers come out just as though the stalk was either placed in water or still on its bulb. The flowers usually remain out for two days. The tepalsegs are white and waxy with slightly waving edges. Down the middle of the reverse runs a broad stripe of a shade of light green containing both blue and gray; dark enough to show through to the inside of the flower and very much in evidence on the long upward-pointing buds. Inside the flower, the waxy filaments tipped with golden anthers are exceeded by the white pistil.

“Though *Hesperocallis undulata* is fond of open sun-scorched places, it is found consorting with many desert plants. It likes flat sandy spots with the attending Burrow-weed, *Franseria dumosa*, and *Atriplex* and *Parosela* species. It has a preference for Mesquite, *Prosopis chilensis*, crowned hummocks. It has an inclination for sandy washes, especially those where a thin layer of clay has covered the top during the rains and at the time of the plants flowering is dry enough to crack, peel off and curl up. Perhaps the unusually heavy rains of the last winter left too thick a crust over the sand, for I noticed that many of the Lily spears had not been able to penetrate it. Others had pierced the surface but seem to have spent their strength doing so for they began blooming when only a few inches high.

“California boasts many superb stands of *Desert Glory Lily*, but the bulb reaches the height of its development in southwestern Arizona and is especially abundant in a tiny range of mountains and an adjacent valley not far from the California border. The Amerinds call the Lily, *Ajo*, which is Spanish for garlic, and use the bulbs for food, and have given its name to the little mountain range as well as to a nearby junction.

“Even though the bulb has a slight taste of garlic, the flower compensates with its delightful fragrance. My first *Desert Glory Lily* bloom was found by literally following my nose. I pointed, hunting dog fashion, not

toward the scent of garlic but at a strong and exotic fragrance, and moving in that direction, arrived at my Lily, shining there in the moonlight.

“I have never been successful in growing *Hesperocallis undulata*. That does not mean that it cannot be grown in captivity. The trial I gave it in southern California was not a fair one and it would be hopeless to try it here on the fogbound Monterey Peninsula, though I long to experiment again.

“I think the bulb would stand a good deal of cold. It can get bitterly cold at night on the Ajo Mountains. But it is a dry coldness and *Hesperocallis undulata* must not have dampness and cold at the same time. If the bulb were to be grown in a container that receptacle should be very deep as the Lily bulbs are sometimes two feet beneath the surface. I would try one part clay and the rest sand and put several inches of small stones at the bottom of the pot or can. Once a week during the period of growth water should run through the container but no drop of it should remain there. There would be no good in attempting to grow the bulb unless it could be given intense dry heat during growth and for at least a month after all signs of life above ground had disappeared. In the long run it would be simpler to pick up and move on to the desert.”

#### DISCOVERY OF THE DESERT GLORY LILY

From the day when the *Desert Glory Lily* was discovered by the Botanist Dr. J. G. Cooper, with the U.S.-Mexican Boundary Survey, 1860-1861, it was never studied on the basis of anatomy and chemical composition. Asa Gray at Harvard University, who named the plant from a dried specimen probably never noted the alliaceous scent, and thus did not recognize its relationship to the *Alliaceae*. It was this chemical marker that convinced Traub (1972) that it was related to the spicate *Himalayan Onion Lily*, and the common *Onion Lily*.

#### FAMILY 1. *HESPEROCALLACEAE* TRAUB

Plant Life 28: 129-132. 1972; Traub, [Order Alliales], in New Encyclopedia Britannica, 1974. Vol. 10, p. 976.

NOMENIFER: Genus *Hesperocallis* Asa Gray (1868).

*DIAGNOSIS*: Rootstock bulbous; main leaves basal, stem erect with only a few leaves in lower part; inflorescence a rameme, bracts subtending the fragrant flowers, pedicels jointed at the apex; perigone united below the middle (= tepaltube), with 6 divisions (= tepalsegs) above; stamens 6, inserted in the throat; ovary superior, 3-celled; stigma discoid; capsule loculicidal; seeds many, black, flattened.

#### TRIBE 1. *HESPEROCALLEAE* TRAUB

Plant Life: 24: 50. 1968; Plant Life 28: 131. 1972.

NOMENIFER: Genus *Hesperocallis* Asa Gray (1868).



GENUS *HESPEROCALLIS* ASA GRAY

Proc. Amer. Acad. 7: 390-391. 1868; Engl. E. P. ed 1. 1887; Krause, E. P. ed. 2. vol. 15a. 1930; Hutchinson, Fam. Fl. Plants, Monocots. 91. 1934; ed. 2. Vol. 2. 601. 1959; Traub, Intro., Herbert, Amaryll. ed. 1970, p. 80; Traub, Order Alliales, Plant Life 28; 131. 1972.

1. *Hesperocallis undulata* Asa Gray, in Acad. Amer. Sci. 7: 391. 1868; Rountree, Herbertia 8: 149-151, pl. 219. 1941; Kearney & Peebles, Arizona Flora, 177. 1951; Munz & Keck, California Flora, 1330. 1959.

HOLONOMENIFER: J. G. Cooper, s. n. (GH), on right side of sheet only; collected by Dr. J. G. Cooper, U.S. Geol. Survey, 1860-1861; Ft. Mojave; 2 basal leaves, upper part of flower stalk; 1 floret mounted, 2 florets in attached envelope; bulb missing. Specimen in poor condition. The specimens on the left side of the sheet were mounted later and thus have no connection with the holonomenifer specimen. The holonomenifer specimen has been lost.

**DESCRIPTION:** *DESERT GLORY LILY*. Perennial herb, with a racemose inflorescence, having an alliaceous taste and scent when bruised. *Bulb* tunicated, ovoid, 4-6 cm. long, deeply seated in the ground, sometimes as deeply as 60 cm. *Basal leaves* linear, 20-50 cm. long, 8-15 mm. wide, appearing in February and dying down by mid-May, mostly strongly undulate on the white margins, iridescent blue-green, leathery, arched, touching the ground at the tips. *Stem* 30-180 cm. long, blue-green, stout, single or sometimes 1- or 2-branched, with an elongated terminal raceme; leaves on stem below raceme rather sparse, much smaller than the basal leaves. *Raceme* 10-30 cm. long, 10-15-60-flowered, *bracts* subtending the flowers conspicuous, scarious, broadly-ovate, 1-1.5 cm. long, *pedicels* about 1 cm. long, jointed at the apex. *Perigone* united below the middle (= tepaltube), 6-parted above (= tepalsegs); tepalsegs waxy-white within with a silvery-green lineate band on the back, delightfully fragrant. *Ovary* superior, oblong, 3-celled; ovules many per cell. *Tepaltube* 1.5-2 cm. long. *Tepalsegs* spatulate, 5-7 nerved, apex bluntly acute to roundish, withering-persistent, 3-4 cm. long, 6-10 mm. wide, divergent, white within, with a silvery greenish lineate band on the back. *Stamens* 6, free, filaments filiform, waxy, 2-2.5 cm. long; anthers linear, 7 mm. long, golden, versatile. *Style* filiform, white, persistent, overtopping the stamens, equaling the tepalsegs; stigma discoid. *Capsule* subglobose, deeply 3-lobed, 1.2-6 cm. long, loculicidally dehiscent; seeds many per locule, horizontal, flattened, about 5 cm. long and wide, jet-black.  $2n = 48$  (Cave, 1948).

**RANGE**—California: locally common on dry sandy flats, and gentle slopes below 762 m., Creosote Bush shrub, Mojave Desert, in San Bernardo County, Colorado Desert in eastern Riverside and Imperial Counties, west to western Arizona; most common in the small Ajo Mountain range and adjacent valley in Pima County, not far from the California border.

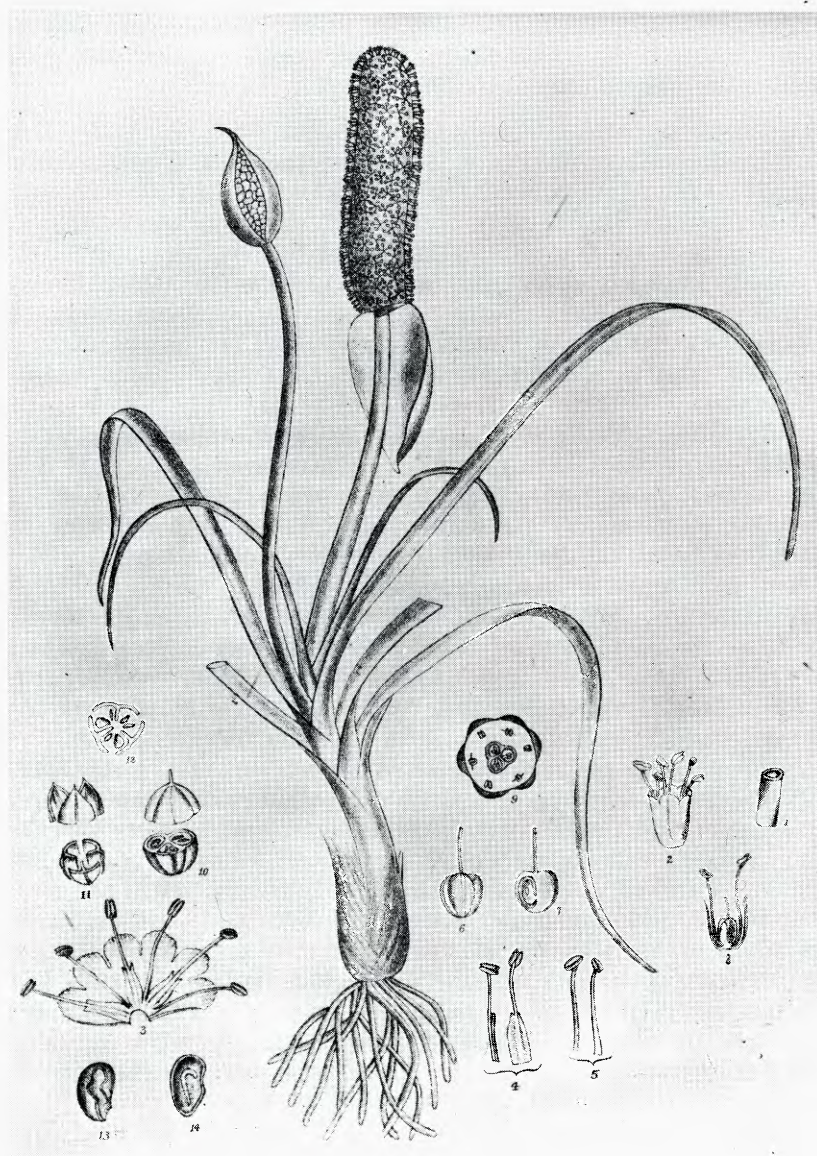


Fig. 30. *Milula spicata* Prain, native to Tibet and Nepal. The Himalayan Onion Lily, a "Living Fossil" Reproduced from Plate 200, Prain, Ann. Roy. Bot. Gard. 5:165. 1896.

Kearney & Peebles (1951) Western part of Mariposa and Pima counties, and in Mohave and Yuma counties, mostly below 2,000 ft in sandy soil of deserts, Feb. to May. Southwestern Arizona and southeastern California, probably in northwestern Sonora, Mexico.

NOTES—According to Rountree (1941) the flowers last for at least two days. The local Amerinds use the bulbs for food, and call the plant *Ajo*, which is Spanish for garlic. The species reaches the height of its development in southwestern Arizona, and is especially abundant in the small Ajo Mountain Range and adjacent valley, not far from the California border. It has also given its name to the junction town of Ajo.

#### THE HIMALAYAN ONION LILY

D. Prain (1895, 1896) noted that *Milula spicata* Prain was similar to the *Allieae* in most particulars but differed from these in having a spicate inflorescence. He stated that the alliaceous scent was absent on the basis of a dried specimen, the only material to which he had access. He placed it in the new Subtribe *Milulinae* (err. *Miluleae*), Tribe *Allieae* Engl. (*Liliaceae*). K. Krause (1930) elevated the subtribe to tribal rank—Tribe *Miluleae* (Prain) Krause (*Liliaceae*). Hutchinson (1934, 1959) considered the genus *Milula* a “climax genus . . . with a superficial resemblance to the araceous type of inflorescence; probably an advanced type of tribe *Scilleae*,” and he admitted it as an independent tribe under the *Liliaceae*.

Stearn (1960), reported that “J. E. Dandy requested Ludlow, Sherriff and Taylor when on their 1938 expedition, to search especially for *Milula* and to note whether it gave out the garlic odor characteristic of *Allium*. Their resulting observations leave no doubt as to the affinity of *Milula* to *Allium*: ‘roots smelling faintly of *Allium* when bruised . . . eaten by natives and tasting also slightly of *Allium*’ (L., S. & T. 4107); slight smell of onion (L., S. & T. 6218). Ludlow and Sherriff (n. 9913) in 1943 noted smell of onion’”. Stearn (1960) definitely indicated that if the *Allieae* are included in the *Amaryllidaceae*, then *Milula* should also be transferred to that family. Traub (1963) transferred *Milula* as the nomenifer of the tribe *Miluleae* to the *Amaryllidaceae*.

As already indicated, at the beginning of the present chapter, this is the other relict in the Family *Alliales*. It is to be noted that in this case evolution has gone a step nearer to the typical *Onion Lilies*. The scape is leafless, and the inflorescence (a spike) is subtended by a spathe-valve.

*Milula* has survived only in Tibet and Nepal. It is related to *Hesperocallis* of the southwestern United States which is evidenced by the fact that both have the marker of the alliaceous taste and smell when the tissues are bruised. Only a single species of *Milula* has been described.

This spicate “Living Fossil” is native to Tibet and Nepal. It differs from Family *Hesperocallaceae* in the presence of the leafless, spicate inflorescence.

## FAMILY 2. MILULACEAE TRAUB

Plant Life 28: 131. 1972.

DIAGNOSIS: Rootstock a bulb; leaves basal, linear-lanceolate; inflorescence a long spike, the floral part subtended by a single spathe-valve; ovary superior; flowers small, numerous, divisions 6, united below into a tepaltube; stamens 6.

HOLONOMENIFER: Genus *Milula* Prain (1896).

## TRIBE 2. MILULEAE (Prain) Krause

in E. P. ed. 2. 15a: 329. 1930; Traub, Gen. Amaryll. 31. 1963; Traub, Plant Life 28: 121. 1972.

Syn.—Subtribe *Milulinae* (err. *Milulæae*) Prain, in Sci. Mem. Med. Office Army India 9: 57, plate 1. 1895 & in Ann. Roy. Bot. Gard. Calcutta 5: 165. pl. 200. 1896; Plant Life 22: 69. 1966.

NOMENIFER: Genus *Milula* Prain.

## GENUS 2. MILULA Prain

in Sci. Mem. Med. Office Army India 9: plate 1. 1895; & in Ann. Roy. Bot. Gard. Calcutta 5: 165, plate 200. 1896; Plant Life 22: 69. 1966; Krause, E. P. ed. 2. vol. 15a: 329. 1930; Hutchinson, Fam. Fl. Pl. Monocots, p. 100. 1934; & ed. 2. Vol. 2. 611. 1959; Traub, Gen. Amaryll. 31. 1963; Traub, Plant Life 28: 131. 1972.

NOMENIFER: *Milula spicata* Prain.

DIAGNOSIS: Perennial herb with slight alliaceous taste and scent when bruised. *Bulb* tunicate. *Leaves* several, linear-lanceolate. *Scape* leafless, hollow. *Spathe* monophyllous, at the apex of the leafless scape, subtending the spicate inflorescence. *Spike* cylindrical, flowers many, very small, campanulate, becoming green-reddish. *Pedicels* very short. *Perigone* 2.5 mm. long, united below (= tepaltube), 6-parted above (= tepalsegs), tepalsegs equal, about 1 mm. long; tepaltube about 1.5 mm. long; tepalsegs about 1 mm. long. *Stamens* 6, in 2 series, opposite the tepalsegs; 3 with lower half of filaments expanded and petaloid; anthers versatile. *Ovary* superior, subglobose, 3-celled, ovules 2 per cell; style filiform, stigma very small. *Capsule* slender, 3-celled, seeds 1 or 2 per cell, black, oblong, testa corrugated, and very minutely punctate. The name, *Milula*, is an anagram of *Allium* indicating that Prain (1895, 1896) considered it close to *Allium* L.

1. *Milula spicata* Prain, in Sci. Mem. Med. Office Army India 9: pl. 1. 1895; Ann. Roy. Bot. Gard. Calcutta 5(2): 165, pl. 200. 1895 (1896); Plant Life 21: 101. 1965; *ibid.* 22: 69. 1966; Stearn, in Bull. Nat. Hist. Br. Mus. 2: 11-169; 189-191, fig. 4 (range). 1960.

RANGE: Tibet and Nepal: Chumbi, near Do-Tha, southeastern Tibet, Aug. 1878; Indian Bot. Gard. Calcutta; *isonomenifer*: (K); Ludlow, Sheriff & Taylor Nos. 4107; 6218; 9913. 1943 (BM).

DESCRIPTION: Perennial herb with alliaceous taste and scent when



broken. *Bulb* tunicated, elongate, 4-7 cm. long; the lower half covered with fibrous scales which are the remains of old leaves, 2.5-3.5 cm. long; upper half leek-colored; roots fibrous, numerous, 4-5 cm. long. *Leaves* green, several, linear-lanceolate, equaling or surpassing the scape, 10-15 cm. long, 3.3-5 mm. wide. *Scape* leafless, green, hollow, twice as long as the bulb, 6-9 cm. long, 2.5-3.3 mm. in diam. *Spathe* at the apex of the leafless scape, monophyllous, membranous, ovate-acuminate, inclosing the immature spike at first, later deflexed downward, 3 cm. long, 2 cm. wide; bracteoles none. *Spike* cylindric, 2-5 cm. long, 1 cm. in diam.; flowers regular, very many, becoming green-reddish, small, campanulate, 2.5 mm. long, 2.5 mm. in diam. *Ovary* superior, sessile, 3-celled, subglobose, 1.5 mm. in diam.; ovules 2 per cell, attached at the inner angle of the cell above the base. *Perigone* united below (= tepaltube), 6-parted above (tepalsegs), about 1.5 mm. long; tepalsegs equal, their margins undulate-fimbriate, apex rounded, about 1 mm. long. *Stamens* 6 in two series, opposite the tepalsegs; the outer 3 alternate with the ovary cells, and with the lower half of the filaments expanded and petaloid, 4-5 mm. long; the shorter 3 opposite the locules, slightly shorter, filiform upwards; anthers versatile, all perfect. *Style* filiform, simple, 2 mm. long, stigma very small. *Capsule* slender, 3-loculed, 3 mm. in diam., loculicidally dehiscent; seeds 1 or 2 per locule, or both aborted, black, oblong, testa corrugated, very minutely punctate, 2.5 mm. long, 1.5 mm. in diam.

RANGE—The Tibetan plateau southward into the dry Chumbi Valley; and the 'dry zone' of central Nepal.

NOTES—Attempts to obtain living plants of *Milula spicate* have been unsuccessful so far. These are needed for the determination of the chromosome complement.

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[To be continued]

## PLANT LIFE LIBRARY

PLANT LIFE OF THE PACIFIC WORLD, by Elmer D. Merrill. Charles E. Tuttle Co.: Publishers, Rutland, Vermont & Tokyo, Japan. Pp. 297, Illus. \$13.50.

Dr. Elmer Dean Merrill, Arnold Professor of Botany and Director of the Arnold Arboretum, Harvard University, was one of the most outstanding and influential botanists of the mid-century in this country and perhaps in the World. His younger days were spent as a botanist in the Philippines. In this environment and through prodigious field and herbarium studies, he became a leading authority on the flora of Malaysia and Polynesia. After he returned to the States, he continued his studies on the flora of this vast area.

During World War II, Dr. Merrill's tremendous knowledge of the flora of the Pacific Basin was put to practical use in the War effort. He served as a military consultant, and wrote a widely used survival manual concerned with the edible and noxious plants of the island jungles in the region. Another spin-off of this era was the first edition of "Plant Life of the Pacific World." This book has long been out of print. The botanical world owed the publishers (Charles E. Tuttle Co.) a debt of gratitude for producing a Second Edition in an attractive format at a reasonable price. This well organized and copiously illustrated book is bursting with important botanical information. Anyone, be he amateur botanist, scholar, technician, ethnobotanist or professional botanist will find something of interest in the book. It is a pleasure to read.—*Thomas W. Whitaker*

HISTORY OF BOTANICAL SCIENCE: an account of the development of botany from ancient times to the present day, by A. G. Morton. Academic Press, Inc., Oak Tree Road, Palisades, NY 10964. 1981. Pp. 474, Illus. \$21.00 (Paperback).

The author of this well written treatise, A. G. Morton, Emeritus Professor of Botany, London University, deserves the gratitude of the botanical community for producing the first scholarly and readable text of the history of botany in modern times. The coverage is complete, from "The beginnings of the knowledge of plants" to "Botany in the twentieth century."

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INDOOR PLANTS, a popular guide, by Brian and Valerie Proudley. Blandford Press, Dorset. 1981. Distributed by Sterling Publishing Co., 2 Park Ave., New York, New York 10016. \$14.95 hardback. 176 pp. Illus. color.

The popular trend to make homes, offices, lobbies and reception rooms more attractive, and hence more liveable, has stimulated a rash of books about the choice and care of indoor plants, mostly house plants. "Indoor Plants—a popular guide" is one of the better books in this category. Aimed directly at the amateur, it contains ninety-six stunningly beautiful, full page photographs, in color of different species used as house plants. The plants are arranged in alphabetical order according to generic names, from *Abutilon* to *Zebrina*. A description and notes on cultivation accompanies the photograph of each species. The first 14 pages of the book are devoted to such general subjects as "Plants in the home", "Light", "Water", "Atmosphere", "Temperature", "Feeding", "Propagation", "Diseases and Pests", etc. The Proudleys, now residents of New Zealand, have authored a remarkably attractive and useful book. Furthermore, the price is reasonable in comparison with other books in this class.—*Thomas W. Whitaker*

PLANT SPECIATION, Second Edition, by Verne Grant. Columbia University Press, New York. 1981. 563 pp. Illus. paperback.

This second edition of Professor Verne Grant's book "Plant Speciation" is a bulky tome of 563 pages brimming with information. Almost completely rewritten from the First Edition published in 1971, the present edition is organized into 9 parts, divided into 35 chapters. There is a Bibliography of nearly one thousand titles, an Organism Index, an Author Index, and a Subject Index. The author has digested and integrated an immense amount of material, but as he admits, the flood of information about how plant species originate is becoming so large as to be unmanageable.

The specific subject matter is suggested by the titles of the Parts — (1) Population and Races; (2) The Nature of Species; (3) Genetic and Ecological Aspects of Species; (4) Evolutionary Divergence; (5) Natural Hybridization and its Products; (6) Polyploidy; (7) Aneuploidy; (8) Specialized Genetic Systems; (9) Conclusions.

This book is an excellent comprehensive review and synthesis of plant speciation up to 1979. It is fittingly dedicated to that great student of speciation, George Gaylord Simpson.—*Thomas W. Whitaker*

**THE POCKET ENCYCLOPAEDIA OF INDOOR PLANTS**, Age Nicolaisen, 1981. Blandford Press, 269 pp., 7" x 14 ½", \$6.95 paperback.

This is a well-illustrated handbook of plants suitable for indoor culture. It is interesting to see plants which grow outdoors in Southern California included. But this only adds to the variety. The more colorful flowering species are displayed as colored plates, while others have silhouette cameos. The short cultural text is succinct. This is a delightful paperback to give as a gift to friends not too well versed in indoor plant culture.

**PONDS AND WATER GARDENS**, Bill Heritage, 1981. Blandford Press, 168 pp., 7" x 4½", \$12.95 hardback, \$6.95 paperback.

This handbook gives a fundamental discussion of pond construction and design, but is mainly devoted to the culture of suitable water plants. Forty-eight photos show the various plates in color as well as designed settings. Animals to stock the pond are also discussed as is their role in the ecology of the aquatic system. The book will easily convince all but the most obdurate that a garden pond is a must.

**ALPINE GARDEN PLANTS**, Will Ingwersen, 1981. Blandford Press, 153 pp., 7" x 4½", \$12.95 hardback, \$6.95 paperback.

This colorful handbook surveys the world of alpine plants. Culture has as much depth as can be expected for a popular treatment. Many of the plants are not high mountain plants, but rather from rocky habitats. The text discusses rock garden development or pot culture for the plants. The range of plant families represented is surprising.

**ORCHIDS AS INDOOR PLANTS**, Brian & Wilma Rittershausen, 1981. Blandford Press, 88 pp., 6" x 9", \$12.50 hardback.

A book this small could never cover orchids adequately, and it doesn't attempt to do so. The scope is limited to the novice. The plants discussed are selected for hardiness and diversity of form and color. The cultural section of the book covers both warm, humid conditions and cold, dry situations since microclimates in homes vary. It makes a nice gift book.



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

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[AMERICAN AMARYLLIS SOCIETY, continued from page 6.]

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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 forward, and explanatory section about naming daylilies. Manila covers: 100 pages (1—X; 1—90), includes a portrait of George Yeld. \$5.00 postpaid.

**3. THE GENERA OF AMARYLLIDACEAE**, by Hamilton P. Traub. Includes a general introduction, a key to the subfamilies, infrafamilies, tribes, subtribes and genera of the Amaryllidaceae, and descriptions of all the genera. Every member of the Society should have this book for constant reference. Manila covers; publ. 1963; 85 pages. \$8.00 postpaid.

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