PLANT LIFE

AMARYLLIS
YEAR BOOK

1978

Nerine laticoma (Ker. - Gawl.) Dur. & Schinz
Native to South Africa

THE AMERICAN PLANT LIFE SOCIETY

THE AMERICAN PLANT LIFE SOCIETY is organized for the "increase and diffusion of knowledge concerning plant life," and to carry out its objectives the main emphasis is placed on the publication of PLANT LIFE, the periodical devoted to plant life, incl. HERBERTIA, the yearbook devoted exclusively to the amaryllids, sponsored by the affiliated AMERICAN AMARYLLIS SOCIETY. The publications are international in scope. All paid up members are privileged to receive the current issues of PLANT LIFE, incl. HERBERTIA, THE AMARYLLIS YEARBOOK.

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PLANT LIFE

VOLUME 34

[Nos. 1-4, Jan., Apr., Jul. & Oct.]

1978

EDITED BY

HAMILTON P. TRAUB

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THE AMERICAN PLANT LIFE SOCIETY

Box 150, La Jolla, California 92038

Printed in the United States of America

Library of Congress Catalog Card Number: 51-23475

Address correspondence and send membership dues to:
Dr. Thomas W. Whitaker, Executive Secretary,
The American Plant Life Society,
Box 150, La Jolla, California 92038

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The cover design by Prof. Penrith B. Goff pictures **Nerine laticoma** (Ker-Gawl.) Dur. & Schinz which is native to South Africa. It is well worth cultivating out of doors in Southern California, and may be grown as a pot plant farther north.

PLANT LIFE, VOLUME 34, NO. 1, 1978—AMARYLLIS YEAR BOOK
GENERAL AMARYLLID EDITION

PLANT LIFE, VOLUME 34, NOS. 2—4, INCL., 1978
GENERAL EDITION

ILLUSTRATIONS

PLANT LIFE, VOL. 34, N0. 1, January, 1978

AMARYLLIS
YEAR BOOK
1978

Year Book of

The American Amaryllis Society

44th Issue

GENERAL AMARYLLID EDITION

EDITED BY

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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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PREFACE

We are indebted to Prof. Penrith B. Goff for the cover design which pictures *Nerine laticoma* (Ker-Gawl.) Dur. & Schinz, native to South Africa. This interesting species can be grown outdoors in southern California and farther north as a pot-plant indoors. (See *Review of the Genus Nerine,* Appendix to PLANT LIFE Vol. 23. 1967.)

This 45th issue of the American Amaryllis Year Book is dedicated to Dr. Walter S. Flory, Jr., the outstanding authority on the caryology (chromosomes) of the Amaryllidaceae. This subject has interested him since 1937 and he and his collaborators have contributed regularly to a better understanding of the caryology of the Amaryllidaceae over a period of four decades. The award of the William Herbert Medal to him in 1978 was therefore long overdue. Dr. Flory presents an interesting autobiography, a bibliography of his contributions to a knowledge of the caryology of the Amaryllidaceae, and the known geographical distribution and chromosome numbers of the species of *Hymenocallis.*

We are happy to announce that Randell K. Bennett, an outstanding Amaryllidarian has been appointed Chairman of the General Amaryllid Section. It is his function to consider the Amaryllids as a whole, and to fill in the details about the various genera, including particularly those neglected so far and in this manner to present a more complete coverage of the Amaryllis Family. The members should note his first General Amaryllid Report and the article on the control of leafhoppers on amaryllids, below.

There are interesting articles on *Amaryllis* in the present issue: Amaryllis breeding potentials by Dr. William D. Bell; the role of *Amaryllis* species in commercial hybrids by Dr. Cage; a step towards a yellow *Amaryllis* hybrid by R. E. Tisch; breeding double *Amaryllis* by John Wade Deme, and *Amaryllis* culture by E. M. Beckham.

Dr. Howard contributes an article on new *Hymenocallis* species from Mexico.

Randell K. Bennett gives his first report as Chairman of the Amaryllid Committee; Mrs. Marcia C. Wilson presents the 1977 Zephyrantheae Report; Donald D. Duncan contributes the Alstroemeria Committee Report, and Mr. Zuidgeest gives his first Nerine Committee Report from Holland.

Prof. Pierfelice Ravenna contributes two outstanding articles—one on South American Amaryllids, and the other on Allieae of South America.

James E. Shields writes on growing Amaryllids in the Midwest; Richard E. Tisch on *Pancratium maritimum;* W. Roger Fesmire returns as a contributor with an interesting article on Amaryllids on a dry hillside; and Randell K. Bennett writes about leafhoppers on Amaryllids.

There are reports on the 1977 Amaryllis Exhibitions, and other articles as indicated in the Table of contents.

Contributors to the 1979 issue of the AMARYLLIS YEAR BOOK are requested to send their articles by August 1, 1978, in order to insure

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

January 15, 1978, *Hamilton P. Traub*
2678 Prestwick Court, *R. Mitchel Beauchamp*
La Jolla, California 92037 *Thomas W. Whitaker, Harold N. Moldenke*

PLANT LIFE LIBRARY—continued from page 154.

LIPIDS AND LIPID POLYMERS IN HIGHER PLANTS, edited by M. Tevini and H. K. Lichtenthaler. Springer-Verlag New York, 175 Fifth Av., New York City 10010. 1977. Pp. xiv + 306. Illus. $41.40.—The papers included in this volume were presented at a symposium held in 1976 at the Botanical Institute of the University of Karlsrube. The symposium was organized in five sections—(1) function, organization and lipid composition biomembranes, (2) physiology and biochemistry of fatty acids and glycerides; (3) physiology and biochemistry of plant steriods; (4) physiology and biochemistry of prenyllipids, and (5) lipid polymers in higher plants. Literature references and a subject index complete the volume. Highly recommended.

BIOLOGICAL INSECT PEST SUPPRESSION, by Harry C. Coppel and James W. Mertins. Springer-Verlag New York, 175 Fifth Av., New York City, 1977. Pp. xiii + 314. Illus. $29.60.—The text is arranged in five parts: (1) glossary, (2) historical, theoretical and philosophical bases of biological insect pest suppression; (3) organisms used in classical biological insect pest suppression; (4) manipulation of the biological environment for insect suppression, and (5) a fusion of ideas. Literature references and an index complete the volume. Highly recommended.

POLLINATION MECHANISMS, REPRODUCTION AND PLANT BREEDING, by R. Frankel and E. Galup. Springer-Verlag New York, 175 Fifth Av., New York City 10010. 1977. Pp. xi + 281. Illus. $26.40.—The objective of this book is to furnish under one cover an integrated botanical, genetical and breeding-methodological treatment of the reproductive biology of spermophytes, mainly angiosperms which is based on an advanced topical course in plant breeding as taught at the Hebrew University of Jerusalem. Highly recommended.

38—PROGRESS IN BOTANY, edited by H. Ellenberg, K. Esser, H. Merxmueller, E. Schnepf and H. Ziegler. Springer-Verlag New York, 175 Fifth Av., New York City 10010. 1976. Pp. xvi + 377. Illus. $49.20.—This international symposium is partly in the English and German languages. The articles are arranged under four headings: (1) Morphology; (2) Physiology; (3) Genetics; (4) Taxonomy and (5) Geobotany. A subject index completes the volume. Highly recommended.

SACRED NARCOTIC PLANTS OF THE NEW WORLD INDIANS, by Hedwig Schleiffer. Hafner Press, 866 3rd Av., New York City 10022. 1974. Pp. v + 156. Illus. $5.95.—Subtitled "an anthology of texts from the 16th century to date", this compilation is presented with introductory words by R. E. Schultes. After the anthology on the narcotic complex, anthologies are presented for the Mushroom Family, Cactus Family, etc. Indices of Latin names of plants, and plant products, complete the volume.

PLANT LIFE LIBRARY—continued on page 9.

DEDICATED TO

DR. WALTER S. FLORY, JR.

PLANT LIFE LIBRARY—continued from page 8.

TRANSPORT IN PLANTS III - INTRACELLULAR INTERACTIONS AND TRANSPORT PROCESSES, edited by C. R. Stocking and U. Heber. Springer-Verlag New York, 175 Fifth Av., New York City 10010. 1976. Pp. xxii + 517. Illus. $59.50.—The purpose of this volume is to bring together in one book a critical evaluation of the published results on intercellular transport solutes scattered through the literature. The text is arranged in four parts: (1) membrane structure; (2) intracellular reactions, (3) intracellular transport in relation to energy conversion, and (4) theory of membrane transport. Lists of symbols, and references, and author and subject indices, complete the volume. Highly recommended.

PLANT GROWTH REGULATION, edited by P. E. Pilet. Springer-Verlag New York, 175 Fifth Av., New York City 10010. 1977. Pp. xi + 305. Illus. $28.20.—These reports on plant growth substances were presented at the 9th International Conference on Plant Growth Substances, at Lausanne in 1976. The subjects covered include the walls of growing cells; hormones—membranes; hormone analysis; auxins and root growth inhibitors; gibberellins and cytokinins; ethylene and other regulators; gravity and light effects; hormonal control, and paper demonstrations. A subject index completes the volume. Highly recommended.

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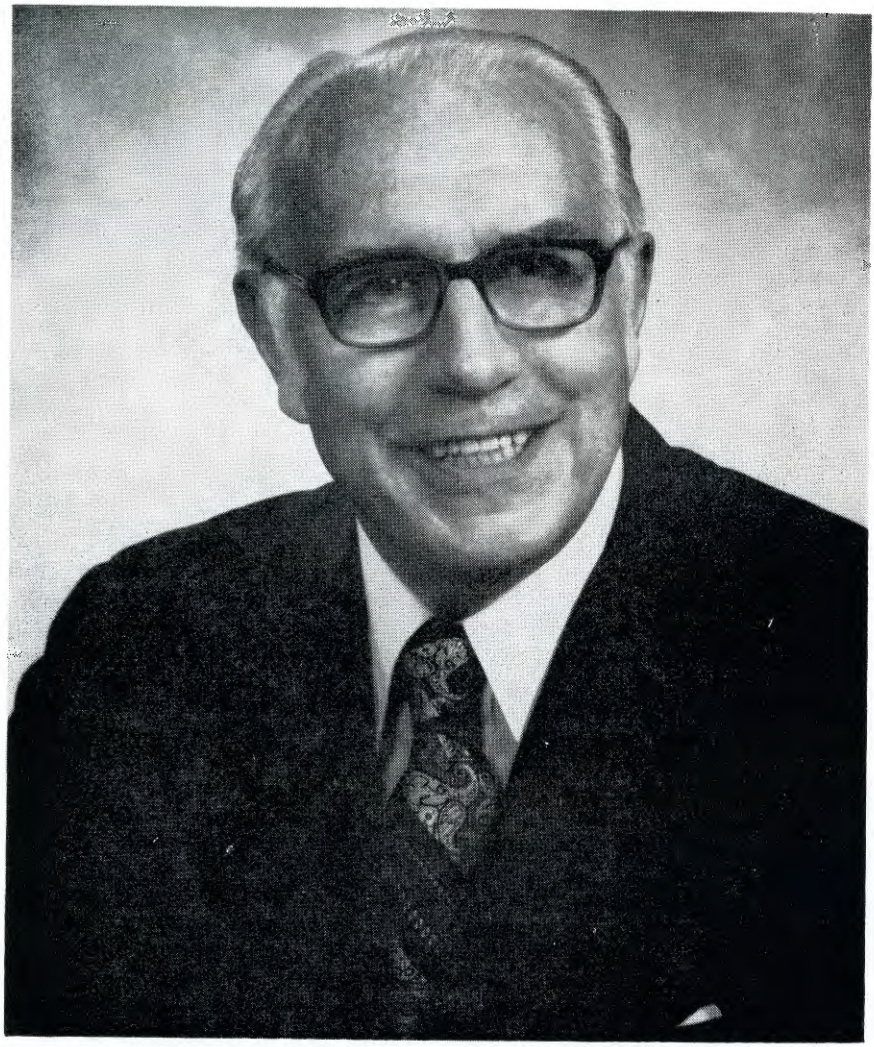

DR. WALTER S. FLORY, JR.—HERBERT MEDALIST

WALTER S. FLORY, JR.

An Autobiography

Born in Bridgewater, Virginia, October 5, 1907, the first 20 years of my life were essentially spent in this small town where my elementary, secondary and college education was received. In 1928 the B.A. degree was received from Bridgewater College, with a double major—in chemistry and in foreign languages (German and French). My parents Ella May Reherd Flory and Walter S. Flory were both very much interested in plants and also in education and educational work. Prior to marriage my mother taught in elementary schools for several years, but she was aways much interested in a variety of yard, garden, and house plants. My father was born on a farm, worked a farm for a few years, and retained and directed the same farm during his lifetime. After receiving the B.A. degree from the University of Nashville (now the George Peabody College for Teachers) in 1892, he also taught school—being a high school principal for some years, served as a railroad mail clerk for a while, and became involved as a stockholder in several business ventures. Although my parents moved to a small college town shortly before my birth, my father—as well as Mother—was always an ardent gardener. As a consequence of parental interests my attention was directed to the raising of animals (cattle, horses, swine, chickens, etc.) and more especially of plants from the time of my earliest recollections.

Upon graduation from college I was offered, and accepted, a DuPont graduate research fellowship in biology at the University of Virginia. Although the fellowship was under the direction of the well-known plant geneticist, botanist and collector—Professor Orland Emile White, during my first year in graduate school I worked most closely with the invertebrate zoologist Professor William A. Kepner. My thesis for the Master's degree, received in 1929, dealt with a description of the male reproductive system of a small flatworm (Turbellarian), *Gyratrix*, and was published in 1930 in the Transactions of the American Microscopical Society.

In the spring of 1929 I began studies in plant genetics and cytology under the direction of Professor O. E. White at The Blandy Experimental Farm, a 700-acre farm and genetics experimental laboratory belonging to the University of Virginia. My studies dealt chiefly with the genetics of sexuality in garden asparagus, and with the cytogenetics of several taxa in the *Phlox* family. The Ph.D was received from Virginia in 1931, my dissertation being titled "Genetic and Cytological Investigations on *Asparagus officinalis* L." This was published in Genetics (Volume 17: 432-467, 1932). Papers dealing with studies on *Phlox*, and other members of the Polemoniaceae, were published in 1931, 1934, 1935, 1937, 1947 and 1971.

Here it should be stated that on April 24, 1930, Nellie Maude Thomas of Bruceton Mills, West Virginia, and I were married. I had

met this charming young lady almost 6 years earlier when we were freshmen in college, and we had a good 41 years together until her untimely death in 1971.

My career took a rather sharp—but short-lived—turn in 1931 when I accepted the position "In Charge of Technical Work" with Shaver Brothers, Inc.—at that time the largest citrus processing company in Florida—with plants in Jacksonville and Tampa. Here my combined chemical and botanical background proved useful. At night, during this period, I studied law—by correspondence with the Blackwood Institute of Chicago. But the winter of 1931-32 was a "black" one for Florida. Shaver Brothers, Inc. was one of the many companies that went into bankruptcy that winter. My chief employer, however, was the president of other processing companies which survived, and for short periods I worked with a pimento processing plant at Wayside, Georgia, and later as a tomato buyer for the Hazelhurst Canning Company in Mississippi.

At this point it was decided that I really wasn't going to "make my first million" in business, and that an academic career looked more attractive than a business one. In the fall of 1932 school positions were much in demand and decidedly scarce. By real luck I obtained a position as Instructor in Mathematics and Chemistry at Greenbrier (Junior) College in Lewisburg, West Virginia, where I remained until the fall of 1934. The pay was negligible, but the town (elevation about 2300 feet), its people, and the surrounding area as a botanical hunting ground were unexcelled. A most pleasant two years were spent in Lewisburg. In 1934 my Alma Mater—Bridgewater College—offered me the position of Professor, and Chairman, of its Biology Department. Accordingly, after three years absence from my native state, I was again back in my own home town.

This second stay in Bridgewater was short. I applied for one of the 30 National Research Fellowships offered by The National Research Council for 1935-36, and was fortunate in being awarded one. Professors E. M. East and Karl Sax of the Bussey Institution and the Arnold Arboretum of Harvard University were agreeable to my working under their direction and in their laboratories during the tenure of the fellowship. At that time East and Sax were at the pinnacle of the genetic hierarchy, and Sax was one of the outstanding men in the world in the relatively new science of Cytogenetics. To work in their laboratories was an envied opportunity, and the training received and contacts made in the year 1935-36 played an important part in the future direction of my career. It may be added that in order for me to use the Harvard Laboratories, I was also appointed a Research Associate of Harvard University.

In the early part of 1936, both Drs. East and Sax received requests from the Texas Agricultural Experiment Station to offer recommendations for someone qualified and trained in genetics to fill a newly created position involving the breeding of horticutural plants especially adapted to Texas. My two mentors were good enough to suggest me for the position, and during the years 1936-44 I served as a Horticulturist of the

Texas Experiment Station at College Station, Texas, as well as a professor on the graduate faculty of Texas A&M College (now University). In this capacity, working under auspices of the federal Bankhead-Jones Act, I had active breeding projects with cabbage (and later with broccoli and with southern peas), with plums, and with certain ornamentals—especially oaks, and roses, but also with oleanders, the Madagascar periwinkle, etc.

None of the plants worked with in my regular projects had chromosomes large enough or unusual enough to furnish particularly interesting cytological material. In my free time I started looking at the chromosomes of some of the native liliaceous and amaryllidaceous taxa. First I looked at the chromosomes of a liliaceous plant very prevalent in Brazos County and all of eastern Texas—the poison camas *(Zigadenus Nuttallii)*—but these—unlike the chromosomes of many taxa of this family—proved to be quite small, also regular, and unexciting. Next I studied several local members of the Zephyrantheae, including *Habranthus texanus* Herb. ex Steud. (2n=24) as well as *Cooperia Drummondii* Herb. and *C. peduncuata* Herb. which were both found to have 48 somatic chromosomes. Also, I collected and studied cytologically *Hymenocallis galvestonensis* (Herb.) Baker and the plant later described by Shinners as *H. Eulae.* The former was usually found by wet roadsides and ditches and in swampy areas, flowered in the early spring soon after sending up leaves, and proved to have 40 somatic chromosomes all of which had interstitial centromeres. *Hymenocallis Eulae* Shinners grew in drier locations, often in deep friable soils, and flowered following late summer rains, long after its leaves had withered and dried. This latter species proved to have a 2n chromosome number of 52, 40 of which were metacentric, and 12 telocentric. The finding of telocentric chromosomes in one of the first two *Hymenocallis* taxa studied proved the forerunner of knowledge concerning a phenomenon (fission of metacentric chromosomes at the centromere to produce 2 telocentrics in place of 1 metacentric—an example of the so-called Robertsonian Law) which is fairly common in the genus, and which quite apparently has played a considerable role in the evolution of *Hymenocallis* (Flory, 1976).

At College Station, Texas, I lived on the Agricultural Experiment Station Horticulture Farm for a number of years. In the spring of the year the park-like area which surrounded the residences on the Farm abounded with the Copper Rain Lily, then usually termed *Zephyranthes texana* (but which was really *Habranthus texanus*), as well as with the fragrant white-flowered *Cooperia Drummondii* Herbert. One spring a great many buds of the Copper Rain Lily were emasculated, and bagged to prevent stigma contamination with unknown pollen. These plants were pollinated at the proper time with pollen coming from various species of *Habranthus, Zephyranthes* and *Cooperia.* To my delight practically all pollinations resulted in good sets and copious amounts of seed. All were carefully planted and tenderly cared for over the several years necessary to bring the resulting bulbs to flowering size. To

my dismay all my "hybrids" turned out to be maternals exactly like the seed parent, the Copper Rain Lily. Some of this work was discussed in my first two papers on *Habranthus* which appeared in *Herbertia* in 1938 and 1939. The explanation was found in some earlier work of Lula Pace's of Baylor University who had found, while working in Strasburger's laboratory in Germany, that in the Copper Rain Lily eggs were formed with unreduced chromosome numbers. When pollination occurred, the two "polar" nuclei in the embryo sac which had previously fused were now united with one of the sperm nuclei. This fertilization resulted in the development of the triploid endosperm, but the egg nucleus was not fertilized. However, as the endosperm grew it furnished nourishment for the unreduced eggs which were now able to grow and develop—without fertilization—into seeds. But the two sets of chromosomes in these seeds had both come from the seed plant. No hybridization occurred. As a result plants from these seed were Copper Rain Lillies—just like the seed plants producing them.

Almost exactly eight years after arriving in Texas, I accepted a position as Horticulturist, in Charge of Fruit Research, with the Virginia Agricultural Experiment Station at Blacksburg, Virginia. My wife and I had arrived in Texas in 1936 with most of our worldly possessions in the rather large trunk of a Ford coupe. Eight years later we left with two young "Texans" and the accumulation of furniture, books, toys, bicycles, etc., common to growing families. The opportunities for research and growth which had been afforded me by such men as A. B. Conner and Paul C. Mangesdorf, Director and Vice-Director of the Texas Station, respectively, were unexcelled. We had formed many close friendships—a number of which still exist 30-odd years later. And we left the Lone Star State with a real love and appreciation for Texas and its wonderful people.

During the three years spent at the Virginia Station two adjacent farms were purchased for the Experiment Station which gave it an excellent several hundred acre tract of good horticultural land and most of which had a very desirable gentle slope toward the Roanoke River Valley. During the three years following purchase, this land was all contoured and was then planted with the best prevailing varieties of apples, peaches, nectarines, grapes, blueberries, blackberries and some other fruits. A collection of all the East Malling dwarfing apple stocks was assembled. Extensive new breeding programs with practically all deciduous fruits were developed, some built on previous work at that station. Test plots for new hybrids were set up in several of the different fruit areas of Virginia. In other words, the three years spent at the Virginia Station were very busy ones, and little time was available for attention to my recently found interest with the Amaryllids.

I was 36 years of age when the move to Blacksburg was made. Favorable research conditions in Texas had resulted in a goodly number of publications under my name, and others followed at V.P.I. The depression was over, the Great War easing its tension, and schools were expanding rapidly. Doubtless due to this combination of circumstances

I found my services in demand as at no other period in my life. Chairmanships of the Horticulture Departments of two large western land grant universities were offered me. A prominent southern state University urged me to accept the chairmanship of its Botany Department. The USDA approached me concerning my interest in a research position with ornamental plants, and a little later the USDA made me a firm offer to become Division Head of their nationwide breeding and cultural work with grapes. One of the good Virginia colleges inquired if I would be interested in having my name considered for its vacant presidency. The Virginia Station countered each such approach by improving my position at Blacksburg, where the location and job were much to our liking. It was during these Blacksburg years that our youngest son was born.

In 1947, however—three years after returning to Virginia from Texas—a new position set up by the University of Virginia was offered me, and accepted. This position was that of Professor of Experimental Horticulture, affiliated with the University of Virginia's Department of Biology, and in addition carried the titles of Vice-Director, and Manager, of the Blandy Experimental Farm—the 700-acre genetic set-up developed for the University of Virginia by Orland E. White. This was the same set-up under which both Dr. Thomas W. Whitaker, Executive Secretary of The American Plant Life Society, and I had worked and received our Ph.D. degrees under the direction of Professor White. Later, in 1955, another title was added to my Virginia position—when I was named Curator of the Orland E. White Research Arboretum, upon the retirement of Dr. White. The Arboretum covered about 130 acres of the Blandy Experimental Farm, contained many species of exotic trees and shrubs (including an excellent collection of conifers) and was located on some of the most fertile soil and in one of the most scenic spots of the beautiful Shenandoah Valley. Newly acquired exotic plants and collections were added to the Arboretum each year.

In the position with the University of Virginia—at the Blandy Experimental Farm—the opportunity presented itself for me to return to my interests with certain members of the Amaryllis family. Almost at once efforts were initiated to secure bulbs of as many different species of the family as possible, with chief efforts being directed toward getting together collections of *Zephyranthes* and their relatives, and of *Hymenocallis*; but species of many other genera were also assembled.

Several different students carried out studies on some of these amaryllids to be reported in the dissertations which they presented and had accepted as one of the requirements for the Ph.D. degree from the University of Virginia. Dr. Thelma Ficker Schmidhauser made a general survey of chromosome numbers, and their likely taxonomic significance, in the Amaryllidaceae. Dr. Smritomoy Bose carried out a careful cytological survey of most of the species of *Lycoris,* and also studied both native and cultivated *Sprekelia* collections in depth. Dr. Raymond Flagg made an exhaustive study of several genera in Tribe Zephyrantheae. All of these works resulted in published contributions throwing con-

siderable light on important biosystematic problems existing in these groups of plants. Several publications appeared in *Herbertia* or in *Plant Life.* During the same period I was studying *Hymenocallis* in as much depth as possible, and was also spending considerable time on research with *Zephyranthes* and its relatives. In addition, I had other doctoral students carrying out biosystematic studies of such plant groups as the conifers, the Araceae (Philodendrons and relatives), the Convolvulaceae (Morning-Glory family), the genus *Rosa,* etc.

When I left Texas and returned to Virginia in 1944 I felt as if I were returning home and fully expected to spend the remainder of my life in my home state. Quite unexpectedly a fork in this straight road arose presenting a choice of direction—in the summer of 1962. Dr. Elton C. Cocke, then Chairman of the Biology Department at Wake Forest College, and a man whom many years before I had known well during graduate school days, called and made an appointment to come to my office to talk concerning a position at Wake Forest. It was thought that Professor Cocke was probably interested in some, or some one, of my former students as potential Assistant Professors for Wake Forest, although I was a little surprised that he would travel 300 miles for that purpose. But when Dr. Cocke arrived he described a new endowed professorship—the Babcock Chair of Botany—which had just been established at Wake Forest. Dr. Paul Sears (author of "Deserts on the March" and other well-known books) had just retired as Professor of Botany at Yale University and had accepted the new professorship at Wake Forest for one year only, 1962-63. The job was being offered me, beginning in the fall of 1963. The first reaction of both myself and of my wife was that we had no interest in leaving the pleasant area where we lived, the circle of friends who had become closer as 16 years had passed, the association with the prestigious University of Virginia, and perhaps most especially to leave the state where I was born, had worked so long, which I greatly loved, and which had treated us so well.

Later in the autumn of 1962 Professor Cocke invited me to visit the Wake Forest Biology Department, and to present a seminar before its staff and graduate students. The invitation was accepted, and we were impressed by the new campus and buildings—first used in 1956—of this school which had been founded in 1834 more than a hundred miles to the east. Even more impressive was the young and enthusiastic group of faculty members which Professor Cocke had assembled. But returning home we were still "Virginians," and had little thought of making a change. Additional correspondence and calls kept the position and its possibilities prominently in mind, however. Finally we began thinking that a change of scene, to a beautiful small city such as Winston-Salem certainly is, working with a strong young faculty, and the opportunity to help develop a "Master's" graduate program into a doctoral one, might be stimulating and bring a new enthusiasm into a career with not too many years to run. The result was that the new position was accepted in February 1963, and plans were underway to secure a home in

Winston-Salem so that we might move in August, before the start of school in September.

This move proved advantageous in most ways. As Chairman of a new Departmental Committee directed to develop a doctoral program, such a program was outlined, planned, approved by the Biology Department, and steered through the Graduate Committee, the Graduate Faculty, the various Administrative Offices, and to final approval by the Board of Trustees in 1969. This was the first departmental doctoral program offered on the Wake Forest (now University) Reynolda Campus (although the Ph.D. degree was being offered by several departments in the Medical School on the Hawthorne Road campus). In 1973 I had the honor of "hooding" Dr. Lorraine B. Spencer and Dr. Francis F. Willingham, as the first two to receive Ph.D. degrees on the Wake Forest Reynolda Campus. Both were my students. Dr. Spencer had written a monograph of the *Zephyranthes* of North and Central America. Dr. Willingham had studied the *Rhododendron calendulaceum* complex in the Blue Ridge mountains. Both were excellent pieces of work. Our Department of Biology has had a number of additional doctoral students in recent years. One of the outstanding recent ones has been Dr. Dwight Kincaid, a student of mine - working with an intricate problem in hollies *(Ilex)*. Receiving his Ph.D. in 1976, Dr. Kincaid is currently Cabot Postdoctroral Research Fellow at Harvard University. A current student, Mrs. Carolyn Strout, is developing as her doctoral research cytological studies of several groups, including as many *Nothoscordum* species as are available.

One advantage of the new position has been the additional time offered for research. I was assured I would never have more than one class per term, and that this would be either a graduate course, or a senior course. This amount of teaching, with small classes, has presented time in which several long-standing Amaryllid projects of mine could be finished. This is attested to, to some extent, by the list of appended publications - with the great majority of those written since 1963 dealing with some Amaryllid group or problem.

Trips to Study and Collect Certain Amaryllidaceous Taxa

Many of the *Hymenocallis* species and Zephyrantheae taxa comprising a chief interest of mine in the Amaryllidaceae are distributed, roughly, through the land areas in or not too far removed from the Gulf of Mexico. Efforts to see, learn, study and/or collect as many of these - especially those north of South America - as possible will now be described. Such efforts have resulted in several trips to various of the southern United States, as well as to Mexico and the West Indies. They have also stimulated work-visits to most of the larger and a number of the smaller herbaria in the United States. In addition several European herbaria have been visited: sometimes in quest of a single type species; to study some of the earlier collected specimens of a plant group; to go over recently accessioned specimens of interest; to confer with inter-

ested curators; etc. Hundreds of amaryllidaceous specimens have been borrowed (occasionally twice, or even several times) from American and foreign herbaria. As these efforts have comprised an important - as well as most interesting - part of studies with representatives of the Amaryllis family, a brief account of the more noteworthy of these follows. The list of those persons to whom I am deeply indebted for aid in various ways, at different institutions and places, is much too long to be included here. A few persons are mentioned, at pertinent places, as especially helpful contributors to the studies.

Although I had spent about two weeks in the Mexico City area in 1940, travelling through the 3 or 4 states around the Federal District, it was not until June of 1952 that I made my first real collecting trip into Mexico. At that time several weeks were spent in the states of Guerrero, Hidalgo, Mexico, Morelos and Puebla; bulbs of several *Hymenocallis* and *Zephyranthes* taxa, as well as of *Sprekelia,* were collected and air-mailed to Virginia through the Hoboken inspection station. Return from Mexico on that 1952 trip was through Cuba, via Yucatan. In Cuba several days were spent searching for *H. praticola* Britton & Wilson in the Provinces of Santa Clara and Las Villas, the original collection sites of that species. However, the weather was dry and unfavorable for flowering and no plants of the desired species were located.

In June of 1954 about a week was spent in the herbarium at Kew Gardens, London - going over the *Zephyranthes* and *Hymenocallis* specimens there. Mr. John Sealy of that institution was interested in both genera and has published excellent accounts of both. As a result there were numerous specimens of these genera in the Kew Herbarium and all were in good shape and well annotated. A short time was also spent in the British Museum Herbarium. The Kew Herbarium, and also the American collection in the British Museum Herbarium, were revisited in late August of 1954, after spending a number of weeks on the continent. Herbaria in Copenhagen, Amsterdam, Stockholm, Zurich and Florence were also searched for specimens of both genera.

On the first day of October, 1954, I flew to San Antonio, Texas, where I met Bruce Cornwell, a friend from the University of Wisconsin. Bruce was not an Amaryllid enthusiast, but he was fond of Mexico, was an expert photographer and a most congenial companion and "aide." After meeting me at the San Antonio airport, Bruce stopped his station wagon at the first supermarket encountered and we stocked up on a good supply of staple foods. Following this, we drove south to Cotulla, Texas (where Lyndon Johnson had taught school for a time), and spent the night preparatory to entering Mexico early the next morning. It should be stated that we both carried sleeping bags. Bruce had a Coleman gas stove, several Army surplus 5-gallon gasoline cans - with spigots welded into the base - to be used as water containers, and other equipment suitable for camping. Most of the month of October was spent in Mexico searching for bulbs, chiefly of *Zephyranthes* and of *Hymenocallis.* When suitable sleeping and eating accommodations were available we used them; when not - we slept in the mountains and cooked our own food.

Our Mexican route traversed roads leading through, or in a few cases barely touching, the states of Tamaulipas, Nuevo Leon, Coahuila, San Luis Potosi, Jalisco, Colima, Michoacan, Mexico, Queretaro, Morelos, Puebla and Hidalgo. The approximate extreme points of our trip were Guadalajara and Uruapan to the west and Puebla to the south. Three nights were spent in the mountains, one of these in a thundering rain. While it was disappointingly dry during the first days, later it was overly wet as Hurricane Hazel swept across the Mexican Plateau. These were not conditions favoring collecting. We did come up with a number of collections of *Zephyranthes* - most of them in the *Z. lindleyana-Z. clintae* complex. While disappointed in the number of *Hymenocallis* taxa seen and collected - later study revealed that we had secured *H. choretis* Hemsley var. *choretis* Traub (from a barranca west of Cuernavaca; 2n=42); *H. choretis* var. *oahacensis* Traub (from south of Puebla; 2n=84); *H. harrisiana* (from near Puebla; mostly 2n=84; some 2n=86); *H. eucharidifolia* Baker (from near Jacala. State of Hidalgo; 2n=44); *H. acutifolia* (Herb.) Sweet (from cultivation in Cuidad Victoria; 2n=46); *H. mexicana* (from the states of both Michoacan and San Luis Potosi; 2n=46); as well as other not certainly identified collections from near the towns of Antigua Morelos (Taumalipas), Jacala (Hidalgo), and Tamazunchala (near the border of the states of Hidalgo and San Luis Potosi). Upon returning to the United States, through Brownsville, we had the fortunate experience of meeting the Morris Clints with whom a lively correspondence concerning common plant interests had been carried on for several years. This 1954 experience was the beginning of an enduring friendship with kind and knowledgeable people who have done much to expand my knowledge of many Amaryllids, as well as of other plants.

In June 1956 I travelled southward on a combined vacation-collecting trip with my family. The trip led to Key West, with a week spent in Dade County, Florida, returning. It also included a short trip by air to the Bahamas. West of Homestead, Florida, and also on one of the Keys, my first *Hymenocallis Palmeri* plants were seen growing, and bulbs of these collected. In the Everglades bulbs of *Crinum americanum* were secured. *Hymenocallis latifolia* was prevalent on several of the Keys and collections were made on both Boca Chica and Biscayne Keys; in both collections, 2n=46. On New Providence Island two collections were made of *H. arenicola.* Bulbs from the beach at Nassau had 50 somatic chromosomes; while a second collection of *H. arenicola* from a Nassau church yard proved to have 52 somatic chromosomes.

A collecting trip into Mexico with Mr. and Mrs. Morris Clint was made in late June and early July of 1957. While interesting, most enjoyable and profitable, the trip was abortive to a certain extent because

of mechanical problems. I flew to Brownsville, Texas, where I was met at the airport by the Clints who were driving a new, air-conditioned car - secured in anticipation of our trip. The night was spent with the Clints in Brownsville, and the next morning we crossed the border, drove to the city of Victoria for lunch, and in the early afternoon were proceeding southward toward El Mante. The new car gradually developed a rumbling sound, which made it seem advisable to stop and hitch-hike a ride into El Mante for aid. The DeSoto agency in that city kindly sent out a wrecker to tow us into El Mante, where it was determined that a defective drive-shaft was involved. This part was not available in El Mante, nor in Mexico City, and had to be ordered from Detroit. This meant a complete replanning of our trip. Some ten days were spent with a pleasant motel in El Mante as headquarters. Arrangements were made with a local taxi driver, Senor Rodriguez Guerrero, who picked us up early each morning - along with four lunches packed by the Motel "cuisine." Each day we went out in a different direction searching for plants, and while our original plans were drastically changed we were able to cover much territory, see many interesting plants, and collect a fair number of bulbs - especially of *Zephyranthes.* A ten-day period under such unexpected circumstances reveals the real character of all concerned. At the end of the trip I was more convinced than ever of the knowledgeability, kindliness, and unexcelled worth of the fine couple with whom I travelled.

In April, 1960, accompanied by my colleague and former student, Dr. Ray Flagg, a collecting trip in Florida and Georgia was undertaken. While southern trips during April had been taken over a period of years - especially to attend meetings at various places of the Association of Southeastern Biologists with some plant collecting along the way - the 1960 trip was made with the sole intent to study Florida *Zephyranthes,* as well as to locate and collect as many *Hymenocallis* as possible. *Zephyranthes atamasco* (L.) Herb. and *Z. treatiae* S. Wats. were found in great profusion at numerous places. Our studies of these, both in nature on the trip and later on collected plants carried back to Virginia, convinced us that these two taxa were really just different physiological forms of one and the same species. If growing in wet places the bulbs proliferated more and usually produced somewhat more vigorous and larger flowers and wider leaves. If growing in relatively dry pine woods, the opposite was true. But both had identical chromosomes, crossed readily reciprocally, and the progeny were indistinguishable in appearance and behavior. *Zephyranthes Simpsonii* Chapman was also seen in profusion. Usually this species is only found south of an imaginary east-west line passing near Bradenton, Florida. We were surprised to find our first specimens of the species in Alachua County, just a short distance out of Gainesville, Florida. But the plants at this point had likely been brought in with ballast used for roadside fills. This latter species, *Z. Simpsonii,* is readily distinguished from *Z.*

atamasco by its more trumpet-shaped flower (with less reflexed tepals) and also by having its filaments contained in the tube. Cytologically, *Z. Simpsonii* has 48 somatic chromosomes - just twice the number found in *Z. atamasco.*

We encountered a number of *Hymenocallis* on this trip, several of them occurring and flowering in rivers. In order to collect bulbs of these one sometimes had to follow a stem down through six or more feet of water and dig the bulb from the muck on the bottom of the river. My 1976 paper on *Hymenocallis* lists (Table 2) the various 1960 Florida and Georgia collections of this genus. Several other short collecting trips to southeastern states followed during the early 1960's.

Late May and early June of 1961 were again spent in Mexico. Dr. Ray Flagg, Research Associate at the University of Virginia, and I flew to Brownsville, Texas. From there we accompanied Mr. and Mrs. Morris Clint, Sr., on a trip which took us first to the state of Vera Cruz. Several days were spent with a comfortable motel in a lush tropical setting at Fortin de les Flores as our headquarters. This was near the base of snow-capped Orizaba, North America's second highest mountain. From here we travelled out in various directions by car, or by train from nearby Cordoba. Trains ran down toward the Isthmus of Tehuantepec, and collections were made along the Rio Blanca, the "River of 7 Waters," and along other rivers. *Cooperia miradorensis* Kranz was seen in great profusion through the state of Vera Cruz, and proved to be a true *Zephyranthes* or member of the Euzephyranthes, as we had concluded it probably was - following an earlier study of its type specimen from the Universisty of Copenhagen.

The 1961 Mexican trip also involved visits to the states of Puebla, Jalisco, Nayarit, Guanojuato, Neuvo Leon, Coahuila, Michoacan, Mexico, Tlaxcala, San Luis Potosi, and perhaps one or two other Mexican states. We returned with a total of about 520 bulbs, belonging to some 10 or 11 genera, plus seed of still other taxa. Altogether it was a most profiitable trip. A number of the taxa had been collected and described earlier by Mrs. Clint. Information on other collections has been, or in some cases still remains to be, described in other articlces.

Much of the month of May, 1964 was spent collecting in the West Indies, especially in Puerto Rico, St. Croix in the Virgin Islands, and in Jamaica. Exit, and re-entry, from and to the United States was through Miami, where my former student, Dr. Robert J. Knight, Geneticist with the U. S. Plant Introduction Division in Miami, greatly facilitated the inspection of the bulbs I had collected. So that this account not become too long, I will only say that the trip was most productive, and that bulbs of most West Indian *Zephyranthes*, and of many *Hymenocallis* of the area were secured. The week of collecting in Jamaica was an especially good one because of the extensive aid of Mr. George

Proctor, Botanist for the Institute of Jamaica (in Kingston), and the easy pin-pointing of collection sites by examination of herbarium specimens and records at the Institute.

In August of 1964 the Tenth International Congress of Botany held in Edinburgh, Scotland, was participated in. The specimens of Amaryllidaceae in the Herbarium of The Royal Botanical Garden at Edinburgh were gone over in detail. Later in the month visits were made to the Universities of Oxford and of Cambridge, and to their gardens and herbaria, and again almost a week was spent in the Kew Herbarium. This was followed by a long anticipated visit to the University of Coimbra, in Coimbra, Portugal, where Professor Abilio Fernandes—who has done so much to clarify the cytological problems involving *Narcissus* and its many horticultural hybrids—was a most friendly and generous host. In a way *Narcissus* is an old world counterpart of *Zephyranthes,* the former being distributed around the Mediterranean while the latter is chiefly present in the islands of, and the countries surrounding the Caribbean. It was a delight to have the opportunity to again see and visit with Professor Fernandes (first met at the Botanical Congress in Paris in 1954) and to see the excellent facilities and the fine staff and work he had developed at a University which was flourishing before Columbus discovered America.

The Kew Herbarium was visited again for five days in 1968, en route to participating in a Seminar on "The Chromosome—Its Structure and Function" being held in Calcutta, and following that to the XI International Congress of Genetics in Tokyo. At both the Calcutta and Tokyo meetings reports were made on new chromosomes (unlike those of any of the parental lines) which were found in complex interspecific and intergeneric hybrids involving different genera and species of Tribe Zephyrantheae. Professor C. Pavan, of the University of Sao Paulo, had found similar phenomena in intergeneric hybrids with certain insects—his suggested explanation being that cytoplasmic effects were likely responsible for the observed changes in chromosome types. This is one phase of cytological investigation, in connection with "wide" hybrids in the Amaryllidaceae, offering a seemingly great potential of interesting and valuable information.

During the early years at Wake Forest (the mid and late sixties) specimens of Zephyrantheae and of *Hymenocallis* were again borrowed (as had been the case while at Virginia) from a number of different herbaria for careful study. On several occasions visits were made to the National Herbarium in Washington and to the Herbarium of the New York Botanical Garden, and to various state herbaria as the opportunities for this occurred. Gradually a feeling of greater familiarity

with the genera of my chief interest has seemed to help clear various questionable points—but many ambiguous points remain.

In 1976 I was again invited to take part in an International Seminar organized by Professor A. K. Sharma and held in Calcutta. This Seminar was attended in October 1976, the general topic being "Chromosomes in Evolution." This presented the opportunity to summarize some of the chromosome work carried out with over 20 genera, in 10 Tribes of the Amaryllidaceae, by myself, students and colleagues over a period of years. The title of my 1976 lecture in Calcutta was "An Overview of Chromosome Evolution in the Amaryllidaceae," a paper expected to appear shortly in the Proceedings Volume of that Seminar.

After 10 days in India, in October 1976, a week was spent in London—most of which time was again spent in studying the specimens of *Zephyranthes* and of *Hymenocallis* in the Herbaria at Kew and at the British Museum. This was my fifth, and probably most profitable, visit to these herbaria.

A Final Word

The years spent in biosystematic studies of certain of the Amaryllidaceae have been interesting, and from my standpoint most profitable. One of the great pleasures involved has been the acquaintanceships—many ripening into real friendships—with many other persons interested in the same or related plants. Most plantsmen, I have found, are generous to a fault—in their offers to share material, information and enthusiam. In many cases such plantsmen when in possession of as many as two bulbs of a rare taxon—are glad to give one of these to a fellow enthusiast. The list of such persons who have aided me is much too long to list here, but such a list would be topped by such people as Kitty Clint, and the late Morris Clint; their daughter, Marcia C. Wilson; Hamilton P. Traub; Raymond O. Flagg; and the late Len Woelfle—to mention just a few. A recent collaborator, Padre Julio Cicero, S. J., of the Dominican Republic, must be acknowledged for his generous help. Padre Cicero has supplied bulbs of rare Zephyrantheae species and hybrids native to his country or resulting from personal crosses. He has also sent bulbs of *Hymenocallis* from his Republic, along with valuable information concerning distribution of the taxa furnished. Botanists, both professionals and amateurs and from many states and many places have shared materials, bulbs, experiences and interests. It is the pleasant association with such people and their work, and also certainly with a group of able and interested student-friends (from whom I have learned a great deal) that would cause me to follow the same path, if a life-trek were to be chosen again.

This account would not be complete without acknowledging the interest, aid, stimulus and "green-thumb" help of my wife Gale Crews Flory, who among other things has efficiently taken over the cultural care of my Amaryllid collections during the past few years.

Finally, one of the profitable satisfactions accompanying plant study has been the constant opening up of new problems, as is true—I am sure—of any scholarly pursuit. One study may seemingly be completed, answering the original question in mind. But at the same time that study usually brings several new questions—as to relationships, origins, possible hybridizations, evolutionary pathways, etc., to mind. It is the interest involved in theorizing as to possible answers, and of how such problems may feasibly be solved which keeps one feeling young, though aging in body—and which makes life an ever more interesting phenomenon.

SPECIAL ACKNOWLEDGMENTS

The stimulation, skill, and vision of Dr. Hamilton P. Traub's personal work, as well as his encouragement to me, as to all Amaryllid lovers, is gratefully acknowledged. His 'brain child'—*The American Plant Life Society*—has done much to forward knowledge concerning many facets and taxa of the Amaryllidaceae, and to account for our present understanding of this family. For financial assistance of various types I am indebted to the National Science Foundation (Grants B3296, G11080 and GB1767), the Virginia Academy of Science, the Wake Forest University Research and Publication Fund, as well as to special funds of Wake Forest University for generous travel grants.

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Rain-Lilies - Little-Known, Colorful and Dainty. Horticulture 53: 82-86. 1975.

Zephyranthes bifolia (Aublet) Roemer: its chromosomes and some taxonomic considerations. (Flory, Julio Cicero and Gerald Smith) Plant Life 32: 47-57. 1976.

Origins of three Texas species of **Zephyranthes.** (R. O. Flagg and Flory) Plant Life 32: 67-80. 1976.

A putative **Zephyranthes** (Amaryllidaceae) hybrid recognized by anthesis timing. (R. O. Flagg and Flory) (Abstract) ASB Bull. 23: 59. 1976.

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General

A review of chromosome numbers in the Hemerocallideae, Alstroemeriales, and Amaryllidales. (Flory and S. H. Yarnell) Herbertia 4: 163-181. 1937.

Chromosome numbers reported in recent years for Hemerocallideae, Alstroemeriales and Amaryllidales. Herbertia 10: 114-123. 1944.

Speciation, mitotic chromosome number and karyotype evolution in the Amaryllidaceae. (Abstract) Proc. X Intern. Cong. Genetics. Montreal. 2: 82. 1958.

An overview of chromosome evolution in the Amaryllidaceae. (38 p. manuscript), in press: Proceedings International Seminar on Chromosome Evolution. Calcutta. 1976.

Other genera of Amaryllidaceae which have been studied in my laboratory by myself, students, or colleagues include **Agapanthus, Allium, Calostemma, Crinum, Eurycles, Haylockia, Lepidopharynx, Nothoscordum, Rhodophiala** and perhaps one or two others. In addition such hybrid taxa as X **Cooperanthes,** X **Crinodonna,** X **Rhodobranthus,** X **Sprekanthus** and X **Sydneya** have been investigated. Published accounts of some of these studies have appeared.

I have had additional papers dealing with such taxa, or subjects, as **Asimina, Asparagus, Beaucarnea, Buxus** (4), cabbage (several), Gymnosperms, **Gyratrix, Ilex, Lochnera, Malus** (6), **Phlox** and relatives, **Pisum,** propagation, **Prunus** (13), **Quercus,** radiation (4), **Rosa** (3), and some others - especially a considerable series of rather popular papers dealing with specific or general horticultural subjects which have appeared in various trade and garden journals.

PLANT LIFE LIBRARY—continued from page 9.

CELLS, MOLECULES AND TEMPERATURE, by V. Ya. Alexandrov; translated from the Russian by V. A. Bernstam. Springer-Verlag New York, 175 Fifth Av., New York City 10010. 1977. Pp. xi + 330. Illus. $39.60.—Subtitled "Conformational flexibility of macromolecules and ecological adaptation," the text is presented in eight chapters, (1) modificational changes of the primary thermoresistance cells; (2) genotypic changes of the primary thermoresistance cells; (3) variation in thermostability of protoplasmic proteins as a basis for changes in the level of primary cellular thermoresistance; (4) Adaptive modifications of conformational flexibility of macromolecules as a basis for changes of the protein thermostability; (5) the plausible points of application of the natural selection during alternation of a correspondence between the level of conformational flexibility of protein molecules and the temperature ecology of a species, (6) plausible mechanism of regulation of the level of conformational flexibility of proteins; (7) thermostability of nucleic acids and the temperature environment of species' life; and (8) saturation of fatty acids and the temperature conditions of life. An epilogue, literature references, and subject index complete the volume. Highly recommendd.

PLANT LIFE LIBRARY—continued on page 46.

Fig. 2. Dr. Hamilton P. Traub, from photo taken a little before the organization of **The American Amaryllis Society** in 1933 (changed to **The American Plant Life Society** in 1945). It is the first portrait of Dr. Traub to appear in **Herbertia** or **Plant Life.**

The portraits of Messrs. R. W. Wheeler and Wyndham Hayward will be found in the 1947 **Herbertia** and 1958 **Plant Life,** respectively. Judge E. G. Duckworth was a very modest man and never furnished a picture for reproduction in **Herbertia** or **Plant Life.**

THE AMERICAN PLANT LIFE SOCIETY 1933-1976 *

THOMAS W. WHITAKER, *Plant Geneticist (Collaborator) USDA, P. O. Box 150, La Jolla, Calif. 92038 and, Executive Secretary, The American Plant Life Society*

As the AMERICAN PLANT LIFE SOCIETY approaches the half-century mark, it is an appropriate occasion to record its organization, its history, its goals and its future. Many gardeners, plantsmen, scientists, and even members are ill informed about the Society, and some who would be interested have never heard of it.

The AMERICAN PLANT LIFE SOCIETY is truly a remarkable one because it is largely the idea and product of a single individual, who at a spry 87 years of age, continues to guide its destiny. Here, I am speaking of Dr. Hamilton P. Traub, who was the inspirational leader of the founding group, and has acted as Editor, since the publication of the first volume of Herbertia in 1934.

The Society was founded as the AMERICAN AMARYLLIS SOCIETY, in 1933, at Orlando, Florida, by four gentlemen with a sustained and abiding interest in *Amaryllis*. They were Dr. H. P. Traub, at that time Principal Physiologist with the U.S. Department of Agriculture, working on fundamental research with subtropical fruits; and Wyndham Hayward, an ex-newspaper reporter, and ardent plantsman. Mr. Hayward was also the proprietor of a nursery in Winter Park, Florida, and he acted as the first Secretary of the Society. The other individuals, Judge E. G. Duckworth and Mr. R. W. Wheeler, were local residents, amateur gardeners, with a special interest in *Amaryllis*. Judge Duckworth was the first treasurer of the Society. The four founders immediately commenced to solicit members, searching out those people known to be *Amaryllis* fans, but also professional nurserymen, growers, and scientists.

The Society started business in 1934 with the publication of HERBERTIA Vol. 1, the AMARYLLIS YEARBOOK. By present day standards, Vol. 1 was pretty thin but it contained much good information. It was a forerunner of the successful policy that has made HERBERTIA and its successor, PLANT LIFE, models of communication among the plethora of publications in the plant world. Dr. Traub, as Editor, has skillfully maintained a balance between sound technical articles, and those that record the observations and practical experiences of innumerable gardners. This blend of the two types of articles is necessary because each has lasting value, and they appeal to both the skilled amateur and those with technical training. The result has been a magazine that is not only pleasing to the membership, but through high standards has created a constant demand among individuals and libraries for back volumes of our publications, even though the first volume was published almost one-half century ago.

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* The substance of a lecture presented before the **Southern California Hemerocallis and Amaryllis Society** on November 20, 1976, at the Los Angeles State and County Artoretum, Arcadia, CA.

In 1944, a change in the structure of the Society was made at the request of members to publish also material other than that concerned with the Amaryllidaceae. As a result of this demand the AMERICAN PLANT LIFE SOCIETY was founded in November, 1944. Also, in 1944 the headquarters of the Society were moved from Florida to California and the first volume of Plant Life was published in 1945.

Fig. 3. The beautiful light pink hybrid **Crinum** clone 'Elizabeth Traub' (**Crinum scabrum** ♀ x **Crinum** hybrid clone 'Ellen Bosanquet' ♂), produced by Dr. Traub in the 1930's. Photo by T. W. Whitaker.

As stated, the purpose of PLANT LIFE was to publish material not necessarily concerned with the Amaryllidaceae. For example, Plant Life Vol. 1 (Nos. 2 & 3), 1945, was devoted exclusively to bromeliads. This is one of the best publications on many aspects of this interesting group, including their taxonomy. This volume still enjoys a brisk sale to bromeliad fanciers.

Both HERBERTIA and PLANT LIFE were published in 1945, 1946, 1947, and 1948. By this time, 1949, dual publication was commencing to overburden the resources of the Society. In order to cut publication costs the two journals were merged under the name "Plant Life and the Yearbook of the American Amaryllis Society." The latter is now an integral part of The AMERICAN PLANT LIFE SOCIETY.

In its short history, 1934 to 1948, HERBERTIA published some outstanding research. For example, Volume 9 contained an article by Dr.

H. A. Jones which reviewed for the first time a method for the production of hybrid onion seed, and the genetics of this phenomena. At present, most of the onions produced in this country are of hybrid origin. Bulbs from hybrid seed have many advantages over bulbs produced from open pollinated seed. Among the two most important are greater productivity and superior uniformity of the hybrids.

Fig. 4. **Hemerocallis washingtonia** (tetraploid species) clone 'Golden Ring' produced by Dr. Traub in the 1960's. **Crinum bulbispermum** forma **album** in the background. Photo by T. W. Whitaker.

The Society has an impressive publication record. Fifteen volumes of HERBERTIA were issued from 1934 to 1948. Thirty-three volumes of PLANT LIFE have been issued since 1945. In addition, the Society has published the 3 books listed below:

Traub, H. P., and H. N. Moldenke, 1949, Amaryllidaceae: Tribe Amarylleae. Amer. Plant Life Society. La Jolla, CA. 194 pp.

Traub, H. P., 1963. The Genera of Amaryllidaceae. Amer. Plant Life Society. La Jola, CA. 85 pp.

Traub, H. P., 1964. Lineagics. Amer. Plant Life Soc., La Jolla, CA.

163 pp.

Another valuable publication of the Society is a list of *Hermerocallis* clones by Norton, Stunz and Ballard as shown below.

Norton, J. B. S., M. Fredrick Stunz and W. R. Ballard. 1949. Descriptive Catalogue of *Hemerocallis* Clones. 1893-1948. Amer. Plant Life Society, Stanford, CA. 90 pp.

Fig. 5. The large-flowering **Hemerocallis washingtonia** (tetraploid species) clone 'Melon Supreme' produced by Dr. Traub in the 1970's. Flowers are borne on tall branched flower stalks—see Fig. 6. Photo by T. W. Whitaker.

This is a good time to mention a book sponsored by the Society, but published by The Macmilian Co., THE AMARYLLIS MANUAL written by Dr. Traub. This book came out in 1958, and sold like rafts at a shipwreck. The 4000 or so books published were quickly sold, and those individuals foresighted, or lucky enough to buy one, found themselves in possession of a collectors item. THE AMARYLLIS MANUAL has not been reprinted despite a persistent demand, and a revision is not in the immediate offing.

The Society is in possession of the TRAUB PLANT SCIENCE LIBRARY (literature of plant science), the gift of our Editor-Treasurer.

One of the original purposes of the Society was to foster and encourage the staging of *Amaryllis* shows across the country. The first *Amaryllis* show at Orlando, Florida under the sponsorship of the Society took place in 1934. Since that time local *Amaryllis* groups have been formed in Mobile, New Orleans, Houston, Southern California, Corpus Christi (Texas), and perhaps at other locations. These groups regularly stage annual Amaryllis shows.

Another function of the Society is the registration of Amaryllis clones. The name, a brief description, and other information about each clone is published in Plant Life. Obviously, this service is a vital one for the development of an orderly system of identifying clones and preventing the duplication of names. Up to the present several hundred clones have been registered.

An important fringe benefit available to members of the Society is the opportunity to trade plant materials and exchange information among individuals with similar interests. Dr. Traub, for example, is continually distributing seeds and bulbs to those people with interests in particular groups.

The responsible officers of the Society have tried to keep the dues structure as low as possible, yet cover the costs of the Society's publications and a few minor incidentals. There are no paid employees, although the Executive-Secretary receives a small annual honorarium, which is used mostly to hire a part-time clerical assistant to help with the office chores. Galloping inflation finally caught up with us, and we were forced to raise the annual price of membership from $5.00 to $7.00 in 1974. At $7.00, membership in the AMERICAN PLANT SOCIETY is a bargain compared with the dues of similar organizations that offer comparable services to members.

The annual award of the prestigious HERBERT MEDAL is another notable activity of the Society. The HERBERT MEDAL is conferred upon those individuals deemed worthy, by contributing significantly to the sum-total of our knowledge of the Amaryllidaceae. The award recipients are chosen by the Executive Committee. The Yearbook is dedicated to the Herbert Medal awardee of that year, and carries his autobiography and photograph. Many outstanding scientists and laymen have been honored for their work with this group of plants. Among them are Dr. H. A. Jones, now of El Centro, CA; the late W. Quinn Buck of Arcadia; Sam Caldwell of Nashville, Tenn.; Mrs. Morris Clint of Brownsville, Texas; Mrs. Mary G. Henry of Gladwynne, Penna.; Leonard Doran of Burbank, California; John Cage of Yuba City, California; the late Dr. Martin Cardenas of Cochabamba, Bolivia; and a number of others. The first Herbert Medal Award was made in 1937 to Mr. Arthington Worsley, of Ventnor, Isle of Wight, England, for his pioneer work with the Amaryllidaceae. In all, 49 individuals have received the Herbert Medal; two posthumously, and in 1938, in an effort to catch-up with deserving recipients, five awards were conferred.

The Society had a modest endowment of about $25,000, a gift of our Editor-Treasurer. This endowment was increased by the proceeds from the estate of the late W. Quinn Buck. The sum realized from this source is $40,582. It is proposed that the interest from this endowment will be used to defray publication costs. Specifically, the additional income generated by these funds will allow us to increase the amount of material published in PLANT LIFE, and perhaps publish an occasional monograph.

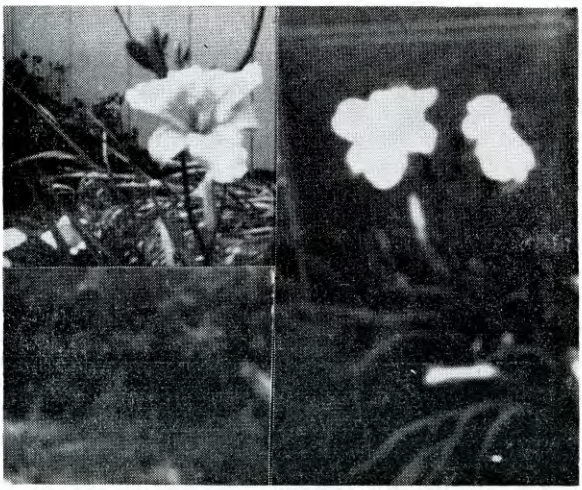

Fig. 6. **Hemerocallis washingtonia** (tetraploid species) clone 'Melon Supreme', a tall plant with very large melon-colored flowers (see also Fig. 5) with creped texture and ruffled edges (upper left). Somewhat out of focus (right), shows good branching on tall plant as contrasted with the usual weak melon tetraploids. Introduced by Dr. Traub in the 1970's. Photos by H. P. Traub.

If I interpret the goals of the "founding fathers" of the AMERICAN AMARYLLIS SOCIETY correctly, it was their original purpose to increase the knowledge and appreciation of the amaryllids, later amended to include all plants, and to communicate the results to any who might be interested. The record suggests that the Society has been reasonably successful in achieving this goal. There are, however, many areas that have only been lightly touched or studied. Take for example, plant exploration; Len Doran has shown what can be accomplished by thorough exploration of the lesser known areas of Brazil and Bolivia. The generous harvest of new germplasm of *Amaryllis* brought to this country by Doran and his co-explorers will no doubt enrich our gardens for generations to come. There is no reason to doubt that careful selection of likely areas with the purpose of extending the search for new germplasm would be equally rewarding.

Another area badly in need of investigation is that of disease and

pest control. It is disheartening to raise plants up to flowering stage, and at that point see them disfigured or destroyed by insects, fungi, or virus. We also need more basic information about growing these plants. This is a wide open field where a knowledgeable plant physiologist could make a significant contribution. Lastly, in the area of plant taxonomy there is a need for young, well trained persons interested in this group to carry on with the prodigious work accomplished by Dr. Traub. It is essential that we know the names of our plants and their relationship to each other.

And finally we need a group of dedicated young people to carry forward the work of the Society that has been so diligently and unselfishly handled by Dr. Traub for over four decades. If we pursue these suggested goals and perhaps others with vigor and persistence we can anticipate a bright future for the Society with continued services to its members.

Fig. 7. The Herbert Medal Award to Mrs. Emma D. Menninger (center) by C. D. Cothran (right), April 24, 1977. Charles Hardman (left). Photo by Phil Rosoff.

PRESENTATION OF THE HERBERT MEDAL APRIL 24, 1977

One of the highlights of the thirteenth annual Show of the Southern California Hemerocallis and Amaryllis Society was the presentation on Sunday morning, April 24 of the Herbert Medal Award of the American Plant Life Society to Mrs. Emma Menninger by C. D. Cothran on behalf of Dr. Traub and the Directors of the American Plant Life Society. On Sunday morning, Show visitors, a number of friends and acquaintances of Mrs. Menninger, and many fellow members of the Southern

California Hemerocallis and Amaryllis Society gathered by the trophy table in the Lecture Hall of the Arboretum where a brief message from Dr. Traub regarding the Award was read to Mrs. Menninger by Mr. Cothran. The Herbert Medal was then handed to her, and she was congratulated by a number of people.

Mrs. Menninger responded by saying that she was delighted to receive the Medal, but it seemed not quite right to receive a medal for something she enjoyed doing so much. Among the cited accomplishments for receiving the Award was her work with Nerines, particularly some lovely white ones. Developing these according to Mrs. Menninger was not work, but a hobby, and it was very nice to receive a commendation for something it was such a pleasure to do.

Prior to Mrs. Menninger, three other members of the Southern California Hemerocallis and Amaryllis Society have been awarded the Herbert Medal; Mr. Leonard Doran, Mr. Quinn Buck, and Mr. John Cage. Only Mr. Leonard Doran was able to be present at the above ceremony.

After the presentation and taking of photographs Mrs. Menninger greeted a number of friends, and with Mr. Charles Hardman then proceeded to enjoy the Amaryllis Show.—*C. D. Cothran*

EDITOR'S MAIL BAG

The Editor enjoyed a pleasant visit from Mr. & Mrs. Raymond J. Chesnick, 130 W. La Cienega Road, San Marcos 92069 on Sunday, February 6, 1977. They delivered the Robert P. Miller Medal bestowed upon me by the American Hemerocallis Society in 1975 for my introduction of *Hemerocallis washingtonia* (tetraploid species) clone 'White Cloud'.

The Editor enjoyed a visit from Mr. G. A. M. Zuidgeest, the noted hybridizer of Nerines, Middelbroekweg 71, Honselersdijk, Netherlands, and Mr. Hans Rood, Koninginnelaan 48, Rijk (Z. H.), Netherlands, in May 1977.

Members of the Society interested in plant tissue culture will want to consult "Plant Tissue Culture and Its Bio-technological Application", edited by Barz, Reinhard and Zenk, reviewed in the present issue of PLANT LIFE. It should be available at the larger libraries.

Otto Koeltz, Antiquariat, P. O. B. 1360, D-6240 Koenigstein, Western Germany, lists Traub—*The Amaryllis Manual,* 1958, at 49.—DM (Deutsche Marks). This is a rare opportunity to obtain this collector's item. How many copies he has is not indicated.

1. REGIONAL ACTIVITY AND EXHIBITIONS

The 1977 Amaryllis Show Season began early on March 26 with the 1977 Greater New Orleans Official All-Horticulture Amaryllis Show, followed by the 1977 New Orleans Intra-Club Amaryllis Show on April 2, 1977. The Corpus Christi (Texas) Amaryllis Show was held on April 2nd and 3rd, and the Greater Houston Amaryllis Club Show followed on April 4, 1977. The Amaryllis Society of Alabama Show was staged on April 16th and 17th, and the Houston Amaryllis Society Official Show on April 17th. The Southern California Official Amaryllis Show was held on April 23rd and 24th. The season closed with the Spring Extravaganza at Arcadia, California on May 21st and 22nd.

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 Jola, 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.

1977 GREATER NEW ORLEANS OFFICIAL ALL-HORTICULTURE AMARYLLIS SHOW

L. W. Mazzeno, Jr.
944 Beverly Garden Drive, Metairie, La. 70002

The eighteenth annual all-horticulture Amaryllis Show of the Men's Amaryllis Club of New Orleans was held in the fountain area of Lakeside Shopping Center Mall in Metairie, Louisiana. The date was March 26, 1977, the earliest date chosen for the Show in many years. As is the usual custom the public was invited to participate in the show. They responded with 35 of the total 208 entries, nine blue ribbons and one trophy.

This winter in New Orleans was the coldest in quite a number of years and its effect on the number of Show entries was quite evident. However, despite the shortage of entries the overall quality was the best in many years.

Continuing the pace he set in the two preceding years, Holly H. Bowers, Jr. carried off the Lion's share of the trophies; the "Best in Show" rosette, the H. Bowers Award and the Member's Choice Rosette for a beautiful but unregistered seedling; the James Mahan Memorial Award for the best named and registered hybrid as well as the Ludwig Challenge Cup with a "Ludwig It"; the T.A.C. Constuction Co. Award for best unnamed and unregistered hybrid; the Reuter Seed Co. Inc. Award for best cut flower; the O. J. Robert, Sr., Trophy for best three-

floret potted registered hybrid ''Ludwig Dazzler''; the George Merz, Jr. Trophy for most blue ribbons (27) won by a Club member; and two Sweepstakes Rosettes. The Robert Diermayer Memorial Award, certainly one of the most coveted awards in the Show was merited by A. T. Diermayer for the best hybrid in the Breeder's Class. He also took the Amaryllis Inc. Award for Best Amaryllis Species with a ''Pardina''; the Jerome Peuler Trophy for best unnamed single floret specimen; the Lester Laine Trophy for best potted specimen double flower; and the Nola Luckett Trophy for the best two-floret potted specimen with a ''Beautiful Lady''.

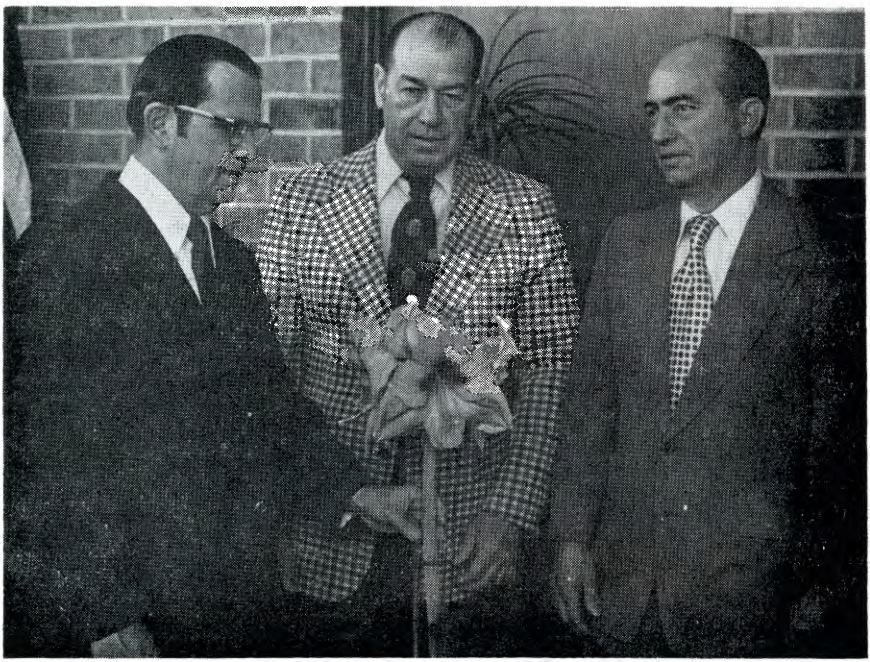

Fig. 8. (From left to right) Messrs. L. W. Mazzeno, Jr., A. T. Diermayer and H. F. Bowers, Jr., at the Men's Amaryllis Club of New Orleans Show, 1977, admiring a choice exhibit.

With a ''Pamela'', L. W. Mazzeno, Jr. won the W. J. Perrin Memorial Award for runner-up to the best registered and named hybrid, and the Laurence Mazzeno Trophy for best minature hybrid. The Edward F. Authement Memorial Award for runner-up to the best unnamed, unregistered hybrid was also won by L. W. Mazzeno, Jr.

The Vincent Peuler Trophy for best registered single floret went to L. W. Mazzeno, Sr. with a magnificent ''Glorious Victory'' for the second straight year with the same hybrid.

Also repeating her accomplishment was non member Cathy Gautier

who was runner-up in the Breeder's Class and took home the Southern Seed and Popcorn Co. Inc. Trophy.

Over half the membership entered flowers in the Show. In addition to the above mentioned winners the following merited blue ribbons: T. A. Calamari, Jr., Emile Flouss, Albert Touzet, Jerome Peuler, Lester Laine, Harold Reinhardt, Al Flores, Oscar Robert, Victor Pannell, and Vincent Peuler.

The success of any horticultural show depends on the combined efforts of many people. The prime mover in this Show was our general chairman, A. T. Diermayer, Jr. In addition to overseeing all the operations on the day of the Show he was also responsible for extensive publicity in major national gardening magazines, local newspapers, radio and television coverage. He was ably assisted by co-chairman Vincent Peuler and other members too numerous to mention here. We must, however, recognize especially our judges who gave so generously of their time to perform their difficult task in their usual dedicated manner. And, last, but by no means least to the donors of all of our trophies. Their awards are certainly a highlight of our Show each year.

1977 NEW ORLEANS INTRA-CLUB AMARYLLIS SHOW

L. W. Mazzeno, Jr.
944 Beverly Garden Drive, Metairie, La. 70002

The fifth annual Intra-Club all horticulture Amaryllis show was staged by the Men's Amaryllis Club of New Orleans on April 2, 1977 in the City Park Backer Room. Sixteen members entered 56 specimens in the competition. Trophies were awarded to George Merz, Jr. for the best 4-floret specimen, "Cupido"; and, to Emile P. J. Flauss for the best 3-floret specimen, "Candy Cane", and best 2-floret specimen, "Prima Donna".

The Club's regular annual Show, open to the public, was held March 26, and is reported separately.

1977 CORPUS CHRISTI (TEXAS) AMARYLLIS SHOW

Mrs. Carl C. Henny, *Corresponding Secretary,*
P. O. Box 3054, Corpus Christi, Texas 78404

Our Annual "Festival of Flowers" was held on April 2nd and 3rd, despite the fact that we "Texans" suffered severe cold and wet weather for four months, with an early freeze, which damaged many of our hardy plants. However, our Amaryllis bulbs were protected by mulching and did not suffer any damage. Those planted in pots were protected from the cold—by placing them in lath houses or greenhouses. The Theme for our Show was "Texas Brags".

We were fortunate in having 65 entries for our Amaryllis Display, since some of our named varieties bloomed early or did not bloom until after our show date.

Ludwig named and registered bulbs and specimens entered were:

'Apple Blossom', 'Fire Dance', 'Fantastica', 'Ludwig's It', 'Peppermint', 'Royal Dutch', 'Pinksterflower', and Hippeastrum Pink. Among the Gracilis Type were: Bianca, Carina, Firefly, Little Sweetheart, Melody Lane, Picture, and Pixie. Also among the Ludwig named varieties were: Beautiful Lady, Front Page, Ludwig's Goliath, Sight Show, and Trixie. Mrs. Carl Henny entered a lovely dark red Van Meeuwen specimen named "Belinda". Mr. J. M. Mabe entered a lovely potted "Hadeco-Apple Blossom."

Mr. J. M. Mabe was awarded the "Silver Bowl" given club members for receiving the greatest number of blue ribbons in the Ludwig Registered and Named Amaryllis. He also received an "Award of Merit" from the Council of "Garden Clubs" and from "The American Amaryllis Society" for his entry of "Apple Blossom", which scored 96 points.

Mrs. Carl C. Henny, club member, received a "Special Trophy" for receiving the greatest number of blue ribbons in the "BREEDERS CLASS".

Awards of Merit from the American Amaryllis Society were also given to:

Mrs. Elsie Balke, for her entry of Hippeastrum-Pink—scoring 95 points.
Mr. Loise Rockowitz, for his entry of "Johnsonni"—scoring 95 points.

Preliminary Commendation Awards were given to: (from the American Amaryllis Society):

Mrs. Carl C. Henny, Mrs. Vlasta Kruse, Mrs. J. M. Bluhm, Mrs. A. S. Meers, and Mrs. D. L. W. Carter, for their entries—all scoring 95 points.

Judges for the Amaryllis Exhibit were: Mrs. E. B. Jenks, Master Judge and Mrs. D. P. Martin, National Judge and Amaryllis Judge—both from San Antonio, Texas. Also Mrs. C. E. Weeks, a Master Judge, from Corpus Christi, Texas.

Mrs. Elsie Balke, Club president, arranged a Propagation Display, which contained seeds from Amaryllis, year old bulblets and 2 year old plants, and a potted Amaryllis in bloom which interested many who were attending the "Plant Sale Booth".

THE GREATER HOUSTON AMARYLLIS CLUB SHOW

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

Due to weather conditions, the Greater Houston Amaryllis Club presented an Educational Show on April 4, 1977 at the Houston Garden Center, which proved to be very popular. As with all States, Texas had its share of unusually cold weather and the amaryllis were slow in showing buds by this early date which resulted in only about fifty exhibits entered. A panel of Judges discussed each specimen, in conjunction with the new scale of points, and scored each for the benefit of members and visitors, and much was gained by those who strive to enter

show quality blooms.

Amaryllis Species along with Clivias added interest to the show, and we had our usual entries by those who have been carrying on a gratifying hybridizing program. Each year there are more Dutch seedlings shown, and are probably the most popular feature of the shows. Those showing seedlings gave demonstrations of hybridizing, and answered questions concerning selection of crosses for floret shape and color. The results of cross-pollination was shown in each stage of development from seed pod, to planting of the seeds and the progress made, showing growing plants, through the several years to the mature plant. We also presented an exhibit on different methods of vegetative and asexual propagation for those who were interested in multiplying a particular variety.

The exhibit with samples of potting ingredients, fertilizers and suggested potting procedure was of interest to the visitors, as well as learning from our Hostesses when was the proper time in our Gulf Coast area to fertilize, put out insect repellants, mulch, etc.

Although some specimens had abnormalities in the scape and florets due to the cold Winter, there were trophy quality entries shown as per the decision of the Judges. Mrs. Bertha Cone showed "Ludwig's Goliath" which scored 98 and "Twinkling Star" received a 96. Mrs. P. A. Froebel's two Ludwig entries "Bouquet" and "Eastern Dream" received 98 each and her Van Meeuwen's "Glorious Victory" a 95. Mrs. Louise Fawcett's dark, dark red "Seedling" gave her a score of 97.

Each show attracts visitors who are mainly interested in arrangements and even though we did not have an official show the Artistic Division's use of amaryllis would not have made you feel there was a shortage of blossoms. They showed a magnificent combination of amaryllis with other materials.

Our Show Chairman, Mrs. John H. Ellett, was delighted that we converted our show into this facinating Educational Show and were able to continue to 'promote interest in growing amaryllis'.

THE AMARYLLIS SOCIETY OF ALABAMA INC. SHOW - 1977

Mrs. Velma Thompson, *President,*
Box 17, Mt. Vernon, Ala. 36560

The Amaryllis Society of Alabama Inc., held its Ninth Annual Spring Show at the Chickasaw Civic Center on Grant Street in Chickasaw, Alabama on April 16th and 17th, 1977. The theme of the show was "Curtain Call for Amaryllis". There was much interest shown in both the horticulture and artistic arrangement divisions. Mr. Dewey Hardy of Eight Mile was the Show Chairman this year.

Mr. Dewey Hardy of Eight Mile, Alabama won the AMERICAN NATIONAL BANK TROPHY for the best named Dutch potted specimen in the show, in addition, Mr. Hardy won the following trophies: CLAUDE H. MOORE MEMORIAL TROPHY, THE WILMER

SMITH TROPHY, THE CECIL BATES TROPHY.

Mr. C. E. Tagert of Mobile won the following trophies: PRESIDENT'S AWARD, CHAVIS FURNITURE COMPANY TROPHY, EMILE SCHEURMANN, SR., MEMORIAL TROPHY, AMARYLLIS SOCIETY OF ALA., INC., TROPHY, MERCHANTS NATIONAL BANK TROPHY, MARTHA BURDETTE MEMORIAL TROPHY, T. J. SWETMAN TROPHY, VINCENT KILBORN SR. MEMORIAL TROPHY, C. E. TAGERT SR., TROPHY, and C. E. TAGERT SR., TROPHY.

Mrs. Claudine Pierce of Mt. Vernon won the MR. & MRS. H. P. WHEAT MEMORIAL TROPHY.

Mrs. Mittie Young of Chickasaw, won the following trophies: LITTLE GLASS SHACK AWARD, and GAYLORD'S DEPT STORE AWARD.

Mrs. Velma Thompson of Mt. Vernon won the CLAUDINE PIERCE TROPHY.

Mae Brown of Mobile won the following trophies: CENTRAL BANK OF MOBILE TROPHY, and the MAE BROWN TROPHY.

Mrs. Betty Hardy of Eight Mile won the following trophies: VELMA THOMPSON TROPHY, and MITTIE YOUNG TROPHY.

Mrs. Mae Allen of Chickasaw won the ALABAMA FURNITURE COMPANY TROPHY.

Mrs. Irene Massingill of Chickasaw won the SULLY'S DRIVE-IN TROPHY; Mrs. K. W. Koontz of Mobile won the following trophies in the Non-Member Class: two AMARYLLIS SOCIETY OF ALABAMA, INC. TROPHIES.

The Judges for the show were from Hattiesburg, Mississippi: Mrs. Luther N. Davis, Mr. Luther N. Davis, Mrs. E. R. Trussel, Mr. E. R. Trussel, Mrs. Mollie Fowler, Mrs. Maye Gaucher, and Mrs. Ethel F. Newton.

After the judging of the show, the Judges were guests of the Amaryllis Society of Alabama, Inc., at a luncheon at a Mobile Restaurant.

HOUSTON AMARYLLIS SOCIETY OFFICIAL SHOW 1977

Mrs. A. C. Pickard, *Official Show Chairman*
1909 Alta Vista, Alvin, Texas 77511

Flower Show Chairman, Mrs. Troy Wright; Staging Chairman, Mrs. R. L. Culpepper; Artistic Chairman, Mrs. E. Blankenship; Publicity Chairman, Mrs. A. Brittian; Plant Sales Chairman, Mrs. Nellie Thompson; Honorary Chairman, Mrs. L. E. Morgan.

The theme of the April 17, 1977 Houston Amaryllis Society Official Show, was "'Amaryllis, The Beautiful Lady'", which covered all classes, including the Artistic Section and tested the skills of our judges. The Award winners of the show were as follows: *Award of Merit*—'Beacon', Leopoldii type, Div. 5, bulb in possession less than one year,

exhibited by Mrs. L. E. Morgan; *Second Award*—'Apple Blossom', Leopoldii type, Div. 5, bulb in possession more than one year, exhibited by Mrs. Wm. Birch; *Queen of the Show*—'Zenith', Leopoldii type, Div. 5, bulb in possession more than one year, exhibited by Mrs. E. Koon; *Species Award—Amaryllis striata,* Div. 1, exhibited by Mrs. A. F. Legatski; *Miniature hybrid Award*—"Graceful Clone", Div. 8, exhibited by Mrs. L. E. Morgan.

The weather was extremely cold during the winter, holding the garden bulb blooms to a minimum for the Spring show. The Artistic Section, with Amaryllis predominant, was non-competative and displayed in unique containers which offered great originality and inspiration.

With the Spring Amaryllis enthusiasm at its peak, the Educational Table was well supplied with all the answers to cultural questions. There were demonstrations of potting, planting seeds, soil mix, and methods of propagation.

The plant sale tables offered many varieties of plants and bulbs plus a lot of friendship and aid to the horticulturist.

The show was judged by official Amaryllis judges.

1977 SOUTHERN CALIFORNIA OFFICIAL AMARYLLIS SHOW

Gladys Williams and Joe Werling, *Chairpersons*

Southern California Official Hemerocallis and Amaryllis Show of 1977 was held at the beautiful Arboretum in Arcadia, April 23rd and 24th.

The success of the Thirteenth Annual Amaryllis Show can be attributed to the diligent efforts of many dedicated members. The theme "Spring Gladness and Madness" attracted a record attendance of over 8,000 persons for this two-day event.

The background flowers were again donated from the late Mr. Angell's Loma Linda field of Amaryllis, courtesy of the Angell family. Mr. Bruce Claflin also offered many cut blooms for our show from his numerous Amaryllis seedling crosses. Mr. Claflin grows his bulbs in rows between the avocado trees on his acreage at the foot of the Sierra Madre mountain range at Upland in a very rocky wash.

Due to variable weather conditions the flowers unfolded their splendor somewhat spasmodically in the open fields and in the gardens. In spite of this irregularity we had a successful show and the Show Committee was very appreciative of the many flower scapes the members contributed.

For the first time the Show Committee, headed by Gladys Williams offered a bulb sale to the public. Towards the far end of the exhibition hall the bulbs were sold. Our sale was unique because each bulb had its flower scape intact so that there would be no doubt as to

what color and form a purchaser would be buying. The few dollars the Society realized would help support the Society's public service program. The bulbs were from the Angell family's growing grounds.

The Flower Arrangement section of our Thirteenth Show was a togetherness adventure mainly by Alice Hanson, Marion Harshbarger, and Dorothy Rose. An arrangement of green and mohogany Papillio by Marion Harshbarger centered the awards table. Some of the materials for the background were collected and trucked in by Harold and Dorothy Rose from far away places. Considerable public interest in these artistic displays were especially noted.

Mrs. Emma Menninger was awarded the Herbert Medal. More about that in Mr. Cothrans seperate article.

1977 SHOW BASICS

1. Sweepstakes for most blue ribbons—The Cecil Houdyshel Trophy won by Dee Cothran.
2. The Sweepstake runnerup—to Fred Boutin.
3. Best registered Ludwig variety scoring over 95 points—Ludwig Challenge Cup to Dee Cothran for "Marie Goretti".
4. Best registered, other than Ludwig—to Fred Boutin for "Parsival", scoring 95½ points.
5. Best liked flower in show from Judges viewpoint—to Fred Boutin for Seedling No. 29 - Mauve and White.
6. Popularity Poll winner No. 54—a seedling Blended Creamy Pink Picotee - to Dee Cothran. All received silver awards.

HYBRIDIZERS AWARDS

A. Best Leopoldii seedling No. 68 - to Sterling Harshbarger.
B. Best Reginae seedling No. 77 - to Dee Cothran.
C. Best Gracilis seeding No. 14 - to Ed Pencall.
D. Best small flowered Leopoldii seedling No. 131 - to Henry Myers.
E. Best Belladonna seedling No. 18 - to Dee Cothran.
F. Best overall seedling No. 68—The Quinn Buck Memorial Trophy - to Sterling Harshbarger.

P.C. from American Amaryllis Society went to Fred Boutin for No. 89, to Sterling Harshbarger for No. 68, to Dee Cothran for No. 77 which scored 93 points. No. 81 - 91½ points and No. 54 to Ed Pencall, No. 38 and No. 49 rating 90 points and 88½ points. Awards of Merit to Sterling Harshbarger for "Nostalgia". Awards of Merit to Fred Boutin for "Parsival" and Awards of Merit to Dee Cothran for "Marie Goretti".

Judges special ribbons were given to Dee Cothran for a double specimen, to Sterling Harshbarger for a Papilio seedling, Fred Boutin for a Komen variety, Bruce Claflin for a purple-red No. 24 and Dr. Rogers for No. 128 seedling.

Rosettes went to Alice Hanson, Marion Harshbarger and Dorothy Rose for special arrangements. Also to Jim Wienstock, Bruce Claflin, and Angell Family for the colorful background flowers they donated.

There were fourteen exhibitors, several hundred exhibits, hundreds of background flowers from Mrs. Crystall Angell, Mr. Bruce Claflin and Jim Wienstock.

Judges for the Show were Gladys Williams, Roger Fesmire, Jack McCaskill, Fred Boutin and Joe Werling. Special thanks to all who participated.

A highlight after the show and in conjunction with our regular June meeting was a pot luck lunch. All members were invited to express their views and ideas to improve our show for the next year. Senior members offered cultural information and help to our new members in order to enable them to grow show flowers to compete for awards.

1977 SPRING EXTRAVAGANZA

C. D. Cothran,
1733 North Gibbs St., Pomona, CA. 91767

The California Arboretum Foundation and the Los Angeles State and County Arboretum at Arcadia, California presented their Spring Extravaganza for the third year, and the Southern California Hemerocallis and Amaryllis Society was again invited to put in a display. The Extravaganza was held on May 21st and 22nd, and the display area was a large tent-like structure of Saran netting with several tables set up for each exhibiting society.

C. D. Cothran was chairman, and was ably assisted by Gladys Williams, Bob Melton, Joe Werling, Sterling and Marian Harshbarger, Mary Geraci, Mildred Cothran, Leonard Doran and Cora Doran, Kenneth Mann, Dorothea Boldt, and Ed Pincall. About fifty scapes of amaryllis, and several hundred blooms of hemerocallis, the latter mainly from Bob Shufeldt's garden were displayed. Also several fine scapes of alstromeria were brought by Joe Werling. Hundreds of camera fans were busy both days, and a scape of Beautiful Lady with four huge blossoms was the principal model.

Amaryllis seeds were given to all who wanted them with instructions for planting and growing on the seedlings. At least two people manned the display at all times during the two days, answered hundreds of questions, and we think we made many friends. Some visitors told of success they had with seed given last year, and one person brought plants to prove it. The Arboretum count showed over ten thousand visitors per day, but we have no way of knowing how many stopped at our display.

AMARYLLIS JUDGE'S CERTIFICATES

Since the last report in the 1974, AMARYLLIS YEAR Book (pp. 28; vi) the following numbered Amaryllis Judges Certificate have been issued:

No. 199. Mr. Frederick C. Boutin, 169 S. San Marino Av., Pasadena, Calif. 91107. Horticulture only.

PLANT LIFE LIBRARY—continued from page 27.

CHROMOSOME BOTANY AND THE ORIGIN OF CULTIVATED PLANTS, 3rd. revised edition, by C. D. Darlington. Hafner Press, 866 3rd Av., New York City 10022. 1973. Pp. xvii + 237. Illus. $12.95.—This revision of a standard text on the subject after more than a quarter of a century will be welcomed. The subject is presented under seven headings, (1) the chromosomes, (2) plants in groups, on the species level, (3) plants in space; chromosome ecology, and geography—polyploidy, basic number, internal hybridity and the effects of migration, (4) plants in time; the four levels of change, basic numbers, chromosome individuality and evolutionary principles; and polymorphism, (5) cultivated plants; (6) ornamental plants, and (7) lessons from chromosome botany. Two appendices, a bibliography and an index complete the volume. Highly recommended.

MEDICINAL BOTANY: PLANTS AFFECTING MAN'S HEALTH, by Walter H. Lewis and Memory P. F. Elvin-Lewis. John Wiley & Sons, 605 3rd Av., New York City 10016. 1977. Pp. xvi + 515. Illus.—The authors have designed this attractive book to bring into perspective the massive knowledge acquired by man to retain his health by using the plants around him." The book is arranged in three sections (1) "Injurious" plants, (2) "Remedial" plants, and (3) "Psychoactive" plants—stimulants, hallucinogens and depressants. There are two appendices (1) outline grouping of the Plant Kingdom which is two decades behind the times [(see Traub, PLANT LIFE **33:** 85-104. 1977), and thus do not recognize Kingdom **Procaryotae,** including the Blue Green Algae **(Cyanophyta),** etc., with the procaryotic cellular organization, and Kingdom **Eucaryotae,** including Subkingdom 1. **Plantae,** the Green, brown, etc. Algae, and vasculat plants—Bryophytes and vascular plants; Subkingdom 2. **Mycotae** (fungi), and Subkingdom 3. Animalia, all with the **eucaryotic** cellular organization] and. (2) Bibliography of herbal medicine. A glossary and Index complete the volume. This outstanding book is highly recommended.

ANATOMY OF SEED PLANTS, 2nd Edition, by Katherine Esau. John Wiley & Sons, 605 3rd Av., New York City. 10016. Pp. xx + 550. Illus. $16.95.—This second edition of a standard text on plant anatomy for students who have had a relatively limited experience in this field, after the lapse of 16 years of progress, will be welcomed for it brings the subject up-to-date. Highly recommended.

BIOCHEMISTRY OF PHOTOSYNTHESIS, 2nd Edition. By Richard P. F. Gregory. John Wiley & Sons, 605 3rd Av., New York City. 10016. 1977. Pp. xiv + 221. Illus.—This second edition of a standard text on photosynthesis brings the subject up-to-date to the end of 1975. The subject matter is arranged in two parts: (1) the context of photosynthesis; the absorption of light; light energy into chemical energy; electron transport; the path of carbon, and (2) evidence for two light-reactions in photosynthesis in green plants; structure of the thylakoid membrane; photosynthetic electron transport; phosphorylation, and chloroplast metabolism and its relation to that of the cell. An appendix, references and author and subject indices complete the volume. Highly recommended.

RESIDUE REVIEWS: RESIDUES OF PESTICIDES AND OTHER CONTAMINATS IN THE TOTAL ENVIRONMENT. VOL. 67. THE CITRUS INDUSTRY PROBLEM: RESEARCH ON ITS CAUSES AND EFFECTS AND APPROACHES TO ITS MINIMIZATION. Edited by Francis A. and Jane Davies Gunther. Springer-Verlag New York, 44 Hartz Way, Secaucus, N. J. 07094. 1977. Pp. 134. Illus. $16.80.—This report is concerned with an estimate of the extent of the problems; foliar dislogable residues; fruit rind residues; orchard dust residues; airborne residues; methods for assessing hazards in treated groves; and summary and conclusions. A list of references and an index complete the volume. Indispensible to all interested in environmental pollution.

PLANT LIFE LIBRARRY—continued from page 68.

2. LINEAGICS

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

KNOWN DISTRIBUTION OF **HYMENOCALLIS** SALISBURY IN NORTH AND MIDDLE AMERICA AND THE WEST INDIES

WALTER S. FLORY
Wake Forest University

Species of *Hymenocallis* have leaves and flowers quite similar to those of the Old World Pancratiums. It is not surprising then that many of the "White Spider-Lilies" first collected and described from the Americas were included in the genus *Pancratium*.

The original volumes of Jackson and Hooker's INDEX KEWENSIS (1893-95) reveal that 45 American species originally described under *Pancratium* were later transferred to *Hymenocallis*. Indicating the complexity of these groups is the considerable synonymy involved with the 45 taxa referred to. Below are listed the species originally placed with *Pancratium*, under the *Hymenocallis* species to which they were transferred.

HYMENOCALLIS TAXA FIRST DESCRIBED AS PANCRATIUM SPECIES

1. **Hymenocallis Amancaes** Nichols
   Pancratium Amancaes (Ker Gawl.)
2. **H. calathina** Nichols
   P. calathiforme Red.
   P. calathinium Ker Gawl.
   P. narcissiflorum Jacq.
3. **H. caribaea** (L. emend. Gawl.) Herb.
   P. amoenum Salisb.
   P. angustum Ker Gawl.
   P. caribaeum Linn.
   P. declinatum Jacq.
   P. excisum Linn.
3. **H. caribaea** (cont.)
   P. patens Delile
   P. recurvatum Stokes
4. **H. caymenensis** Herb.
   P. patens Lindl.
5. **H. crassifolia** Herb.
   P. coronarium LeConte
   P. crassifolium Schult.
   P. occidentale LeConte
6. **H. expansa** Herb.
   P. expansum Sims
7. **H. glauca** Roem.
   P. glaucum Zucc.
8. **H. quitoensis** Herb.
   P. quitoense Schult.
9. **H. lacera** Salisb.
   P. carribaeum Mill.
   P. discoforme DC
   P. mexicanum Lindl.
   P. rotatum Ker Gawl.
10. **H. littoralis** (Jacq.) Salisb.
    P. acutifolium Sweet
    P. americanum Mill.
    P. Dryandri Ker Gawl.
    P. illyricum Blanco
    P. littorale Jacq.
    P. mexicanum Lindl.
    P. Staplesi Steud.
11. **H. ovalifolia** Herb.
    P. ovalifolium Steud.
12. **H. ovata** Roem.
    P. amoenum Ker.
    P. fragrans Salisb.
    P. ovatum Mill.
13. **H. pedalis** Herb.
    P. pedale Schult.
14. **H. speciosa** Salisb.
    P. caribaeum Curt.
    P. formosum Hort. ex M. Roem.
    P. latifolium Mill.
    P. speciosum Salisb.
15. **H. tenuiflora** Herb.
    P. tenuiflorum Herb. ex Steud.
16. **H. tubiflora** Salisb.
    P. guianense Ker Gawl.
    P. petiolatum Willd.
    P. tubiflorum Schult.
17. **H. undulata** Herb.
    P. Boschianum Walp.
    P. triphyllum Willd., ex M. Roem.
    P. undulatum H.B.K.

Other species first included under *Pancratium* were later transferred to such additional genera as *Elisena, Eurycles, Ismene, Stenomesson, Urceolina* or *Vagaria*. Further, the members of some of these genera

were later included with *Hymenocallis.*

ESTABLISHMENT OF **HYMENOCALLIS**

Salisbury in 1812 recognized that the New World relatives of the Old World genus *Pancratium* differed in having seed which were fleshy - rather than non-fleshy; leaves which ran from sessile to petiolate - rather than all having sessile leaves; and with the free parts of the filaments being greater in usually being one-half to 2 inches in length, rather than only about one-quarter inch long. As a consequence Salisbury (1812) moved many of the New World taxa originally placed in *Pancratium* to the new genus *Hymenocallis,* with other species being moved from *Pancratium* to two other newly described genera - *Eurycles* and *Ismene.* Other genera were described for closely related taxa, some of which were later moved to *Hymenocallis.* For instance, Herbert established the genus *Stenomesson* (1821), as well as the genera *Elisena* and *Vagaria* (1837). *Urceolina* was differentiated by Reichenbach, in 1828. Several species originally described under *Pancratium* were eventually moved to each of these genera.

Two treatments of *Hymenocallis* have appeared in comparatively recent years. Sealy's review (1954) recognized 27 species, while 5 others were listed as probably belonging here. Dr. Traub's 1962 treatment which included 56 species, considered *Elisena, Pseudostenomesson* and *Ismene* as subgenera of *Hymenocallis,* and included several of the southeastern United States taxa collected by the late Mrs. Mary G. Henry as new species of *Hymenocallis.* Since 1962 several additional species of *Hymenocallis* collected in Mexico by Dr. Thad Howard and his associates, by Mrs. Morris Clint, and perhaps by others, have increased the number of known species. Additional species from the United States have been described by Moldenke (1967), and Traub (1967).

GEOGRAPHICAL LOCATION OF SPECIES

In Table 1 are listed the known species and hybrids of *Hymenocallis.* Following the name of the several species the country, state, island, or

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Table 1. **Hymenocallis** species arranged by area of location with somatic chromosome numbers where known.

UNITED STATES

henryae Traub (W. Fla.)—38
crassifolia Herb. (S.E. U.S.)—40
galvestonensis (H.) Baker (S.W. U.S.)—40 (42)
palusvirensis Traub (N.C.)—40
rotata (K-G) Herb. (S.E. U.S.)—40 (42)
Palmeri Wats. (Fla.)—42, 46, 48
coronaria (LeConte) Kunth (S.E. U.S.)—44
floridana (Raf.) Morton (Fla.)—46
puntagordensis Traub (Fla.)—46
latifolia (Mill.) Roem. (Fla. Keys)—48
caroliniana (L.) Herb. (S.E. U.S.)—52, 54
Eulae Shinners (S.W. U.S.)—52
occidentalis (LeConte) Kunth (S.E. U.S.)—54
kimballiae Small (W. Fla.)—70
choctawensis Traub (W. Fla.)
pygmaca Traub (S.C., Ga.)
moldenkiana Traub (Ga.)
traubii Moldenke (Fla.)
duvalensis Traub (Fla.)

MEXICO

1. **acutifolia** (Herb.) Sweet (Jalisco, Michoacan, Morelos, Nayarit, Oaxaca, Tamaulipas)—46
2. **azteciana** Traub (Jalisco, Nayarit)
3. **choretis** Hemsley var. **choretis** Traub (Morelos, Nayarit)—42
4. **choretis** Hemsley var. **oahacensis** Traub (Puebla)—84
5. **cordifolia** Micheli (Guerrero)—46
6. **dryandri** (K-G) Sweet (Vera Cruz)—46
7. **eucharidifolia** Baker (Hidalgo, Nayarit, Sinaloa)—44
8. **galvestonensis** Herb. (Baker) (At least some Mexican specimens so labelled are **choretis.**)

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9. **glauca** Roem. (Guerrero, Oaxaca, Puebla)—84 (near **choretis** var. **oahacensis**)
10. **graminifolia** Greenman (Chihuahua, Morelos, Tlaxcala)—60
11. **harrisiana Herb.** (Mexico, Michoacan, Morelos, Puebla)—84, 86
12. **horsmannii** Baker (Jalisco, Nayarit, Vera Cruz)—42
13. **jalicensis** M.E. Jones (Hidalgo, Jalisco)—88
14. **littoralis** (Jacq.) Salisb. (Mexico, Michoacan, Oaxaca)—46
15. **mexicana** (L.) Herb. ex Druce Hidalgo, Michoacan, San Luis Potosi)—46
16. **ovata** (Mill.) Sweet (Oaxaca) (U. Cal. specimen)
17. **pedalis** Herb. (Vera Cruz)—46
18. **repanda** Otto & Diet. (Sinaloa)
19. **riparia** Greenman (Michoacan, Morelos)—46
20. **sinaloaensis** Traub (Sinaloa)
21. **sonorensis** Stand. (Sinaloa, Sonora)—48
22. **speciosa** Salisb. (see Traub 1962)

Additional Taxa Reported by Howard and by Bauml

23. "Hanniballii" (see Bauml, 1972 trip) (Colima, Nayarit)
24. **leavenworthii** (Sinaloa) (much like **acutifolia**)
25. sp. nova (Colima)
26. sp. nova (Mexico)
27. sp. nova (dwarf form) (Colima)
28. sp. nova (Guerrero)

Other Names Encountered on Mexican Specimens

29. **adnata** Herb. (Michoacan) (=**H. littoralis** Salisb.)
30. **concinna** Baker (Kew specimen annotated=**H. dillenii**)
31. **crandallii** (Yucatan) (Nat. Herb. specimen)
32. **dillenii** Roem. (Jalisco, Mexico, Michoacan) (=**mexicana** (L.) Herb. ex Druce)
33. **lacera** Salisb. (Yucatan) (N.Y. Bot. Gard. specimen. Introduced?)
34. **longibracteata** Hochreutina (Vera Cruz)
35. **riposia** Greenman (Morelos)

MIDDLE AMERICA

guatemalensis Traub (Guatemala)
littoralis (Jacq.) Salisb. (Costa Rica, Guatemala, Panama)—49
ovata (Mill.) Sweet (San Salvador)—54
ovata (Mill.) Sweet var. **ornata** (Roem.) Traub (Guatemala)
riparia Greenman (Guatemala) (Kew specimens)
Skinneriana Herb. (Guatemala) (=**H. ovata** (Mill.) Sweet)
tenuiflora Herbert (Guatemala)

WEST INDIES

(and Bermuda)

arenicola Northrop (Bahamas, Haiti, Jamaica)—48, 50
caribaea (L. emend Gawl) Herbert (Antigua, Barbados, Cuba, Haiti, Jamaica, Martinique, Puerto Rico, St. Croix)—46
caymanensis Herbert ("probably=**caribaea**" Baker) (Cuba, Haiti, Jamaica, Little Cayman, Trinidad)
crassifolia Herbert (near **caribaea** (L. emend. Gawl) Herb.) (Bahamas. Introduced?)—40
declinata (Jacq.) Sweet (=**caribaea** (L. emend. Gawl) Herb.) (Bahamas, Bermuda, Cuba, Puerto Rico, St. Croix)
expansa (Herb.) Herbert (Bermuda, Haiti, Martinique, Puerto Rico, St. Croix)—46
fragrans Salisb. (Barbados, Jamaica, St. Catherine's)
guianensis (Ker.) Herb. (=**tubiflora** Salisb.) (St. Kitts, Trinidad)
latifolia (Mill.) Roemer (Cuba, Grand & Little Caymans, Haiti, Jamaica, St. Thomas)—46, 48
ovata (Mill.) Sweet (Cuba)—54?
ovata (Mill.) Sweet var. **ovalifolia** (Herb.) Traub (West Indies)
praticola Britton & Wilson (Cuba)
speciosa Salisb. (Jamaica, Tobago, St. Vincent)—98, 195
stenophylla Urban (=**praticola** B. & W.) (Cuba)
tubiflora Salisb. (Trinidad. Also cult.: Jamaica, Tobago, etc.)

Fig. 9. Distribution of **Hymenocallis** species in Southeastern United States.

area of occurrence is listed, followed by the somatic chromosomes number where known. The species of the United States are essentially listed in ascending order of their somatic chromosome numbers - so far as known. Those from other areas are arranged alphabetically.

The bases for Table 1 have been: (1) the study of specimens from herbaria designated by Holmgren and Keuken (1974) as follows: BH, BM, Duke, E, F, Flas, FSU, GA, GH, K, LL, MO, NCU, NY, SMU, UC, US, VSC, WWF (and perhaps a few others); (2) personal field collections and observations; (3) the works especially of Herbert (1837), Baker (1888), Sealy (1954), and Traub (1962) - as well as some more general works such as those of Small (1933) and of Long and Lakela (1971); (4) articles by such prominent collectors of this genus as Mrs. K. Clint, Dr. Thad Howard, Dr. James Bauml, etc., of their various Mexican trips, with the mention of localities where species have been collected, or where new taxa have been secured. Some of these latter have been described by the collectors, by Dr. Hamilton P. Traub, or by others as new species; and (5) any other source furnishing information on species distribution.

1. IN THE UNITED STATES

It will be noted that 19 different species are listed as occurring in the United States. Not included on the United States list is *H. caribaea* which has apparently been introduced from the West Indies and become established at several places, especially along the Gulf Coast. The names of such taxa as *H. caymenensis, H. collieri, H. keyensis, H. lacinata, H. tridentata* - and perhaps one or two others - are also omitted because of apparently being synonymous with certain species in the list presented.

Figure 9 indicates the approximate distribution of *Hymenocallis* in the Southeastern United States. Distribution of the genus is heaviest towards the east, and extends westward into the eastern portions of Texas (Fig. 11) and Oklahoma, and follows the Mississippi River drainage basin from Louisiana and Mississippi into Arkansas, Missouri, Tennessee, Kentucky, Illinois and Indiana (Fig. 9). The genus is known from 15 states (and at least 129 counties) in the indicated areas.

1A. FLORIDA

Many more *Hymenocallis* representatives are known from Florida than from any other state. Figure 10 has numbers, indicating the taxa listed to the left of the map, in the counties of Florida from which collections of these have been made. In addition to the distributions indicated in Fig. 10, unidentified specimens are also available from Washington and Hendry Counties, Florida. *Hymenocallis* species have been reported from 34, of the 67, counties of Florida - and probably occur in additional counties.

Hymenocalis Palmeri is of particular interest. It was one of two single-flowered species described from south Florida by Sereno Watson in 1888. The second species *H. humilis* has apparently never been satisfactorily isolated from *H. Palmeri,* and in recent years taxonomists have

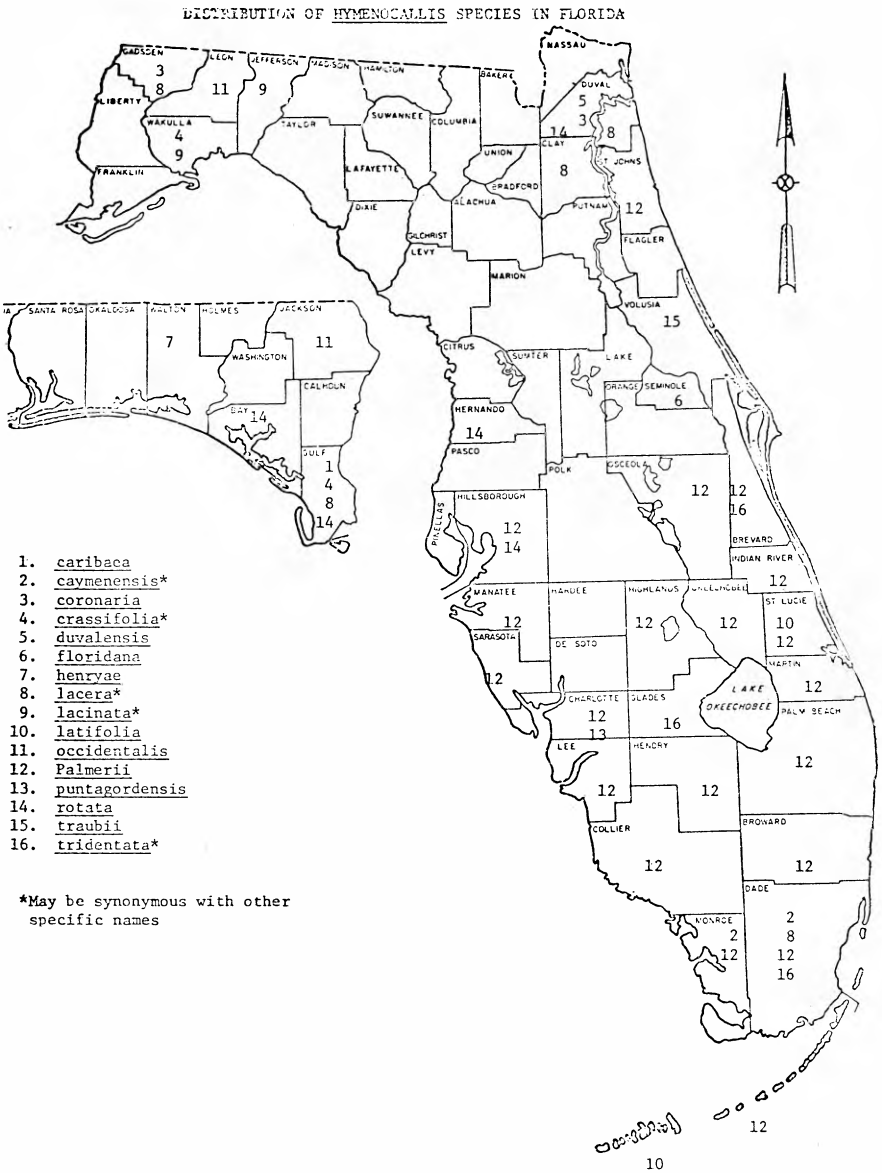

Fig. 10. Distribution of **Hymenocallis** species in Florida.

apparently come to consider the two as more or less synonymous. Single-flowered *Hymenocallis,* apparently *H. Palmeri,* are known from at least 18 south Florida counties, as well as from Johns County further north (see Fig. 10). The single-flowered taxa are found on several of the Keys, and in all counties touching the Atlantic from Dade north to

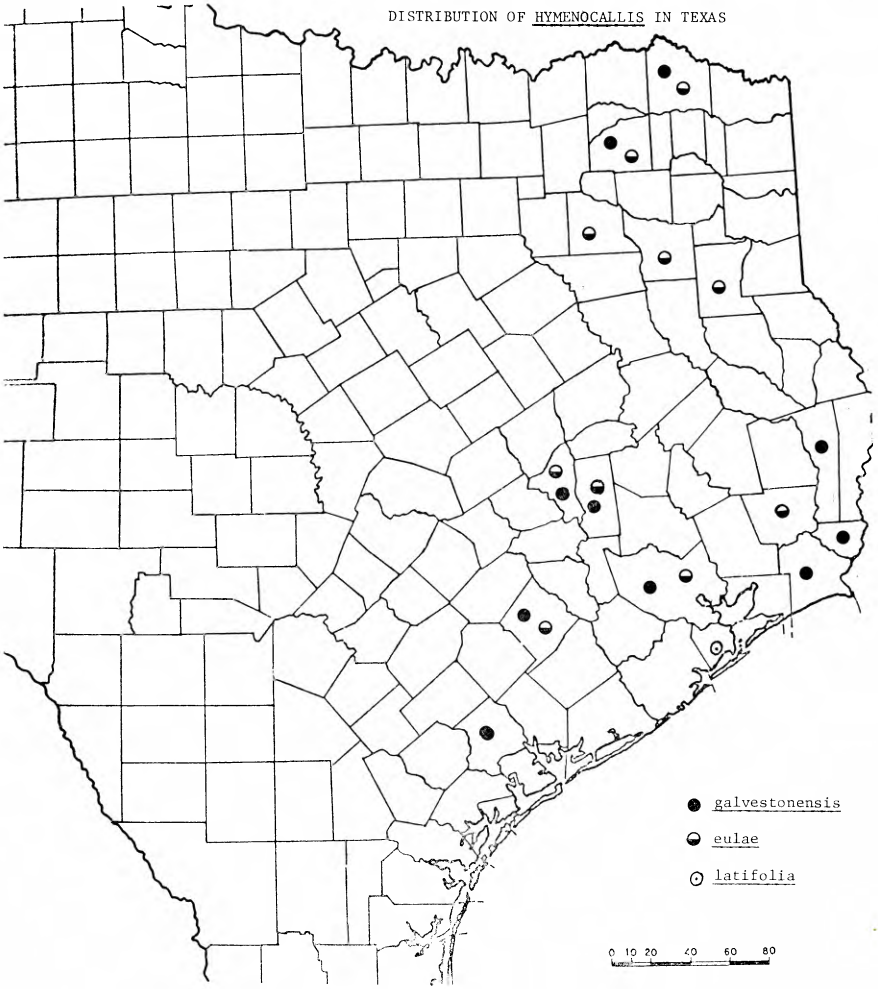

Fig. 11. Distribution of **Hymenocallis** species in Texas.

Brevard. On the Gulf Coast these occur in all counties from Monroe north to Hillsborough. In addition, herbarium specimens are found from four inland counties - Hendry, Highlands, Okeechobee and Osceola. As indicated in Table 1 (*H. palmeri*), three different somatic chromosome

numbers have been encountered for these single-flowered forms, and this from rather limited sampling. More extensive morphological and cytological studies of these may show that more than one single-flowered taxon is present in south Florida.

1B. TEXAS

The known western distribution of *Hymenocallis* is shown in Fig. 11. Specimens from 15 different Texas counties are found among the herbarium specimens studied. Practically all of these specimens are either of *H. galvestonensis* (Herb.) Baker or *H. Eulae* Shinners. While these two taxa often grow in the same areas, they occupy different habitats, and have some sharp differences. The two forms will often leaf out at approximately the same time, at similar latitudes and elevations. However, *H. galvestonensis* usually grows in mucky areas, *H. Eulae* in dry friable soils. The former flowers soon after leaves appear in the early spring, and it has 40 metacentric somatic chromosomes. The latter flowers, from naked scapes, in the late summer and has 52 somatic chromosomes, 12 of which are telocentric. *H. galvestonensis* is known to occur in southeastern Oklahoma, and it would not be surprising to find *H. Eulae* in the same area. The former, at least, occurs fairly widely in Louisiana.

A third species, *H. latifolia,* is sometimes found in the general area of Galveston. This, however, is essentially a West Indian taxon and has probably been introduced into Texas.

1C. NORTH CAROLINA

Distribution of *Hymenocallis* is also presented, in Fig. 9, for North Carolina - the state in which the author lives.

The species indicated by Radford, Ahles and Bell (1968) as *H. crassifolia* Herbert occurs in 5 of the southeastern counties of the state, as indicated in Fig. 9. *Hymenocallis palusvirensis* Traub was collected near Supply in the most southeastern county of the state, Brunswick. *Hymenocallis rotata* (Ker Gawl.) Herb. which is usually found further south, in South Carolina and Georgia, has been collected in Cumberland County in the southeastern part of the state.

A fourth species, *H. coronaria* (LeConte) Kunth, which is found along, and often in, the rivers of the southeastern states, has been collected in the Catawba River in Gaston County. Its bulbs were nestled between rocks just below the water surface, with its strong roots twined firmly around the rocks. This is the furthest north that this species has been noted.

2. IN MEXICO

The country of Mexico is especially rich in *Hymenocallis* taxa which are presently known. Moreover, every extensive collecting trip into the country seems to yield additional, undescribed, species. Taxa are now known from 18 (of Mexico's 29) states, as well as from the Federal

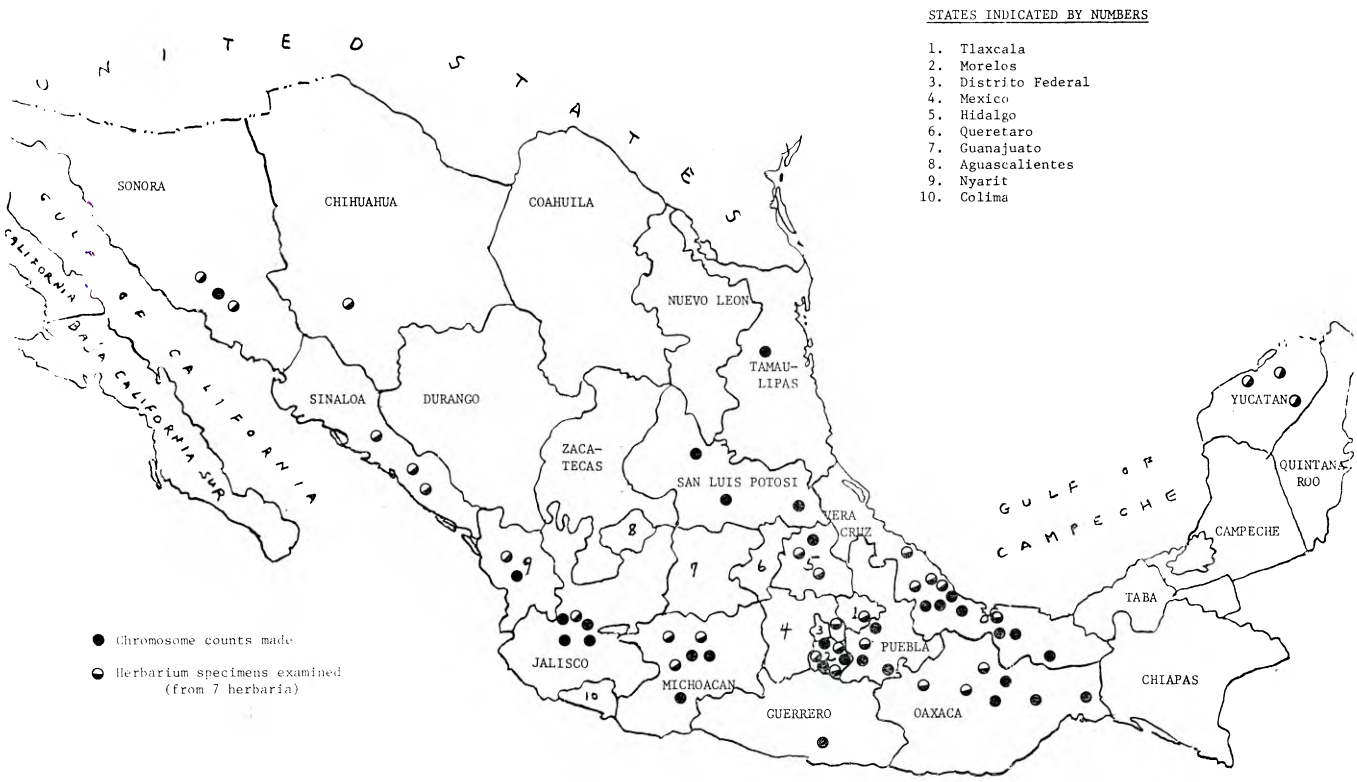

Fig. 12. Distribution of **Hymenocallis** species in Mexico.

District. It is likely that further exploration will reveal an even wider distribution of *Hymenocallis* in Mexico.

Fig. 12 indicates the general known distribution of Mexican *Hymenocallis,* with the half-darkened circles indicating herbarium specimens observed, and the full-dark circles indicating approximate collection points of taxa which have been studied cytologically (Flory, 1976). This map indicates taxa known from 17 states and the Federal District. The map was prepared prior to some of Dr. Howard's and Dr. Bauml's reports which include several species from an eighteenth state, Colima.

In Table 1 are listed the names or designations of *Hymenocallis* reported from Mexico, with known states of occurrence, and any reported chromosome numbers. Geographically, the table and Fig. 12 show a good correlation. The table does list several taxa from Colima, which are not indicated on the map for reasons already explained.

Of the 35 taxa listed for Mexico in Table 1 the first 22 species listed are fairly well accepted. A few exceptions may be noted. *Hymenocallis pedalis* Herb. is usually listed as from further south than Mexico, but specimens collected from apparently native habitats in Vera Cruz cannot be easily differentiated from the herbarium specimens of this species, and apparently represent an extension of its range. Again, *H. choretis* Hemsley var. *choretis* Traub and *H. choretis* Hemsley var. *oahacensis* Traub may very likely represent diploid and tetraploid forms of essentially the same taxon. Further, it is possible that *H. glauca* Roem. is merely a synonym for *H. choretis* Hemsley var. *oahacensis* Traub (as some authors indicate), although there are slight differences in leaf, flower, and glaucousness between plants suggestive of two similar but different taxa. *Hymenocallis ovata* is usually considered an entirely West Indian species; however, there is an apparently unquestionable specimen of this species in the University of California Herbarium marked as coming from Oaxaca. Could this possibly be an introduction into Mexico? Regardless of how the questions concerning the several species discussed in this paragraph are answered, there is no question but that a considerable number of native Mexican species of *Hymenocallis* are known and generally accepted.

In addition, recent reports by Howard and by Bauml (1977, 1976 and earlier) mention the taxa, numbered in Table 1 from 23 through 28, as apparently new and different species. It seems likely that some or all of these will be described and added to the Mexican constituents of the genus in due time.

Then finally, in Table 1 (Nos. 29 through 35) are listed seven names, most if not all of which are synonymous with some of the first 22 names in the Mexican list. Since these names are still encountered from time to time, they are added here for attempted completeness.

It is evident that at the present time the majority of the presently known Mexican *Hymenocallis* occur (Fig. 12) from near the Pacific - in Sinaloa, Nayarit and Jalisco - then roughly eastward more or less along

or near the 20th parallel (South) through the states of Michocan, Mexico, Morelos, Hidalgo, and Puebla into Vera Cruz. Many populations are also known from the state of Oaxaca. To substantiate this concentration one only needs to study Table 1 to note the number of taxa known to occur in the states mentioned: Sinaloa - 5, Nayarit - 6, Jalisco - 5, Michoacan - 7, Mexico 4, Morelos 5, Hidalgo - 3, Puebla - 3, Vera Cruz - 4, Puebla 3, and Oaxaca 4.

A glance at Fig. 12 confirms the apparent scarcity of known *Hymenocallis* in the area of the great Sonoran Desert. This does not seem promising territory in which to discover many more species of this genus. However, the plateau, mountainous, and perhaps also the lower and more tropical areas of the country, to the south, all seem promising areas in which interested and hard-working collectors may anticipate locating a number of additional *Hymenocallis* species.

3. IN MIDDLE AMERICA

Considering the number of *Hymenocallis* taxa known from Mexico, and from South America, a surprisingly few species of the genus have been reported from Middle, or Central, America. The majority of these are known from Guatemala.

Hymenocallis guatemalensis from Guatemala was recently (1967) described by Traub; *H. tenuiflora* Herbert has long been known from the same country; *H. littoralis* (Jacq.) Salisb. was recently collected in Panama (and bulbs sent to us) by Professor Walter Lewis of the Missouri Botanical Garden; and Dr. Traub (1962) lists *H. ovata* Roem. var. *ornata* Traub as occurring in Guatemala; while *H. ovata* had earlier been reported from San Salvador. Baker (1888) reported *H. Skinneriana* Herbert from Guatemala, but this taxon is apparently not recognized by either Sealy (1954) or Traub (1962). All of these forms are listed in Table 1 for completeness.

4. IN THE WEST INDIES

The West Indies are usually considered as the islands in the Atlantic between Florida and South America, including the Bahamas as well as the Greater and Lesser Antilles. Since a few *Hymenocallis* occur in the Bermuda Islands, some apparently naturally - while others are perhaps introduced, reference is also made here to the Bermudas where taxa are found there.

There are about 9 distinct species found through the West Indies, with a few apparently having distinct varieties. These are listed in Table 1 along with the known distributions available to me. Doubtless several - perhaps most - of these species also occur on other islands from which collections have not been made, or if so the collections of which have not been found recorded by this author. In Table 1 several synonyms are included which are frequently found on herbarium specimens from the West Indies, but which are incorrect names, botanically. Such synonymous names are indicated in the table.

DISCUSSION

It is evident from the above text, especially when considered along with Table 1, that approximately 40 distinct species are now known in North and Middle America and the West Indies. A few of these (from 8 to 10) occur in more than one of the geographical areas discussed. It is also evident that several undescribed *Hymenocallis* species, especially from Mexico, are known, and that these will increase the total number when descriptions are available.

Figs. 9, 10, 11 and 12 indicate the general distribution of *Hymenocallis* in the United States and in Mexico, respectively. The distribution areas in Middle America and in the West Indies, are listed in Table 1 so far as known. These areas, in general, are fairly small and it was thought that additional maps would not add greatly to the distribution picture for these geographical entities.

A number of additional species would be added if the South American species, and the known interspecific hybrids, were taken into account. Traub listed 14 South American species in his 1962 article, and has since described such additional species as *H. venezuelensis, H. bolivariana, H. limaensis* and perhaps others. Some interspecific hybrids such as 'Sulphur Queen', 'Daphne', 'Festalis', etc., have been in the trade for a number of years. The late Len Woelfle, and other *Hymenocallis* enthusiasts have considerably increased the numbers of these horticultural forms in recent years, and the possibilities from combining the desirable characters of two or more *Hymenocallis* species are just now beginning to be realized, anticipated, and sought after.

The possibilities inherent in Dr. Traub's subgeneric and Alliance arrangement are also just becoming apparent. Among his 6 Alliances of Subgenus Hymenocallis, all 10 species of Caroliniana are natives of this country, while of the 5 or 6 species in Henryae, all but *H. praticola* (of Cuba) are natives of the United States. The 7 or 8 taxa of Alliance Mexicana are all Mexican natives, as might be expected. The situation is somewhat different with the other three Alliances of this subgenus, however. The 5 species of Alliance Littoralis apparently furnish evolutionary links between Mexican, Middle American and South American forms, and also include *H. senegambica* of West Africa, the lone non-American species. The Caribaea Alliance is made up of predominantly West Indian species, but also furnishes links with Floridian, Mexican, Central American and South American forms. And finally, in the Speciosa Alliance are found not only Mexican and South American species, but taxa which furnish genotypic links between (1) Mexican and West Indian; (2) Central American and West Indian; and (3) South American and West Indian taxa.

As these Alliances become clearer, and as more becomes known about the chromosome conditions and correlations in the various Alliances and subgenera, intelligent planning of genetic and horticultural improvement will be facilitated. There will be a broader base for predicting, instead of just guessing, as to the hybrids which should be

possible, and the desirable characters which can probably be combined.

The biogeographers (collectors and students of distribution), the cytologists, the taxonomists, and the hybridizers, along with those interested in other areas—by combining their knowledge and skills can do a much better job of deciphering relationships and improving their plants, than can any single individual or group working alone. This is one of the great advantages of a Society composed of members with basic—but greatly varied—interests in a single plant family.

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Bennett—LEAFHOPPERS ON AMARYLLIS, continued from page 124.

are probably active year-round here. The young have four or five nymph stages before reaching adulthood.

Some questions to consider are these. Do leafhoppers actually feed on amaryllids? Will newly-emerging nymphs feed on the plant where their eggs were deposited? Do they transmit viruses harmful to amaryllids? Are viruses transmitted during the egg depositing process?

NEW **HYMENOCALLIS** SPECIES FROM MEXICO

T. M. Howard,
16201 San Pedro Av., San Antonio, Texas 78232

I. PROBLEMS IN IDENTIFYING MEXICAN SPECIES

The problems of properly identifying the *Hymenocallis* of Mexico can be intrigueingly frustrating and challenging. To begin with, there are around thirty or so species of this genus to be found, counting the old species and the newly discovered ones. Many of the early species were simply listed for their habitat as "Mexico", with no identifying geographical data given. Those who travel Mexico in quest of plant material know that it is a big country, full of mountains and valleys which helps to isolate species from one another. To simply say that a certain plant is from Mexico is about as helpful as saying it is from the planet earth.

This was the problem in finding *H. eucharidifolia* Baker. We know that this plant existed somewhere in Mexico when it was first described in 1888, but no one seemed to know just where as this information was never given. Sealy stated in his 1954 monograph that it was "described originally from a plant of unknown origin, which flowered at Kew in May 1884, and known from the type material only, namely a single leaf and a scape with one flower and three ovaries." He goes on to state that "so far as number, size, and shape of the leaves is concerned, and their being sessile, *H. eucharidifolia* is nearest to *H. choretis,* but this has a bigger perigone, and the staminal cup is more or less rotate instead of funnel form."

In my early years of collecting Mexican *Hymenocallis,* every new discovery had compared with descriptions of older known species to help in its identification. It soon became apparent that it was easier to find new species than it was to find some of the older known ones. For example, *H. harrisiana* Herbert, though long known and though still found in cultivation, has eluded me right up to the time of this writing. I have visited previous known original habitats, yet have never seen it in the wild. There is the constant reminder that perhaps it no longer exists, at least in these places, as a wild plant, having fallen prey to agriculture.

In 1970, while exploring for plants in Guerrero, a state rich in the number of species in *Milla* and *Hymenocallis,* I chanced to stumble on a *Hymenocallis* of the Mexicana alliance that was quite new to me. Unlike other members of this group with bluish-green (glaucous) foliage, this one had bright green leaves. At this time (early July) it had just finished flowering, and it was not until the following year when it flowered in cultivation, that I was to learn its identity. In reviewing Sealy's monograph I found that it fit *H. eucharidifolia* Baker perfectly, not only in its bright green leaves, but in the shape of its funnel-form staminal cup with erect margins and two teeth between the filaments. The tepaltube was straight and the flowers sweetly fragrant. My

plants first flowered on the 24th of May in 1971. They flowered again in 1972 on the same day. This was a coincidence I thought, and put it out of my mind until I found that the type specimen flowered at Kew, in 1884, also on May 24th!

H. eucharidifolia is endemic to a small area below Chilpancingo, in the state of Guerrero, near the village of Acahuizotla. Compared to other members of the Mexicana alliance, it has to be considered one of the early season bloomers, and if one wishes to collect it in flower, one must go there no later than mid-June. It is the only member of this alliance having broad, thin, Eucharis-like foliage with bright green leaves. The flowers are sweetly scented, unlike *H. choretis,* which is also found there and flowers a month later. There may be 1 to 6 flowers in the umbel. The ovary is sessile, which easily distinguishes it from *H. woelfleana.* The seeds are 1.4 cm long, sharply angled on 2 or more flat planes, rough textured, and are pale dull green. The straight tepal-tubes can be variable in length, ranging from 7 to 13 cm long in individuals. The tepalsegs are shorter than the tube. Pollen is orange.

H. eucharidifolia is quite rare within its limited range, and this partly accounts for its being lost to cultivation for nearly a century. Acahuizotla formerly was just on the old road to Acapulco, but years ago a new road was built that completely bypassed the village. Now one must enter a trail through a gate in order to get to it. It is easily missed.

II. NEW **HYMENOCALLIS** SPECIES FROM MEXICO

Although to the casual eye most *Hymenocallis* species appear similar, the discriminating ameteur collector of these AMERIND LILIES can see subtle differences which escape the non-initiated. It is true that they are almost all white-flowering with one yellow-flowering species, *Hymenocallis* and *amancaes,* a green-flowering species, both native to Peru. The hybridizer could possibly produce yellow flowered hybrids by crossing with the numerous white-flowering species from the southeastern United States, Mexico, Central America, the West Indies and South America.

Milestones in the botany of *Hymenocallis* are few and far between. An excellent historical account of the genus may be found in J. Robert Sealy's Kew Bulletin no. 2, 1954 REVIEW OF THE GENUS HYMENOCALLIS. For practical purposes (and brevity) we might say that R. A. Salisbury (1812) first segregated them from Pancratium and placed them under the genus *Hymenocallis.* William Herbert solidified this position in 1837 in his publication of the Amaryllidaceae. In later years Roemer (1847), Kunth (1850), and Baker (1888) further added their prestigious weight to the position of the validity of the genus. Many decades of nothingness for the genus passed until 1954, when Sealy finally did his needed review. Then in 1962 PLANT LIFE, Dr. H. P. Traub brought the genus up to date for the period. Since then, the finding of several new species has demanded that once more the genus needs further reviewing and that a few revisions be made,

particularly in the species found in Mexico. Some of the species in the Mexicana alliance are fairly common over a wide area covering many states each. *H. choretis,* for example, is found as far West as the state of Michoacan, and as far south as central Oaxaca in a broad band below Mexico City, including the states of Mexico, Guerrero, Puebla, and Morelos. Little wonder that it was one of the first species discovered in this alliance. Likewise, *H. mexicana,* common between Guadalajara and Morelia, is found in Michoacan, Jalisco, and Guanajuato, and is a prominent species along the roadsides. The same may be said for *H. horsmanni* (Jalisco, Nayarit), and *H. sonoriensis* (Sinaloa, Sonora, and Nayarit. These are the so-called "common" members of the Mexicana alliance. They are widespread and are bothered little by grazing and agriculture. If one is looking for *Hymenocallis* of the Mexicana alliance, chances are it will be one of these, depending on the area traveled. There is another group within the alliance composed of endemics, i.e. species confined to a very small geopraphic area and found nowhere else, and it is these that are being introduced for the first time. Some of these are facing extinction, even though so new to science, and there is a good chance that they will disappear within the next decade. The main reason for their eminent demise is the destruction of their habitat for food crops, and the constant overgrazing pressures of livestock . . . cattle, burros, and goats. Already we have very suddenly witnessed millions of *H. durangoensis* covering a huge colony of several square miles, virtually wiped out by the plow. What a pity that these bulbs could not have been dug and sold to bulb dealers, but that is not the way it works. The plant is showy, easy to grow, and makes a fine garden plant and though recently plentiful, it is suddenly rare. Of the four endemics introduced here, only *H. guerreroense* seems temporarily not threatened, but this is subject to change.

While *Hymenocallis* easily show their differences from one another in living material, they can be confusing when examined in the dry state. Part of this is due to distortion and shrinkage. Distortion is easily accomplished in "arranging" the specimen on the blotters in order to properly display them and dry them out as the succulent flowers begin to wilt. What began as a slightly curved tepaltube winds up as a straight one on the dried specimen. Likewise shrinkage of floral parts can make the final result considerably smaller than it was in the living material. In general, the more succulent tissues will shrink at a higher rate than those that are less so. Membranous staminal cups will shrink less than the tepal segs, but the width of the scape will shrink alarmingly from its original size.

Foliage will retain the character of its shape when dried, but will lose an equally important character in that one will not be able to determine if it was originally glossy green, glaucesent, or glaucous. These characters can be most helpful in distinguishing species in living material. The character of the living seed is also very important, but

here again the character is lost when dried. Differences in fragrance, while real and useful in species differentiation in flowering live material, are of no value in a dried specimen. These differences are admittedly subjective, but still it is hoped that a student with normal olfactory senses can perceive the differences in odors of flowers having the smell of new-mown-grass, or chlorine bleach, or a spicy-sweetness.

NEW **HYMENOCALLIS** SPECIES FROM MEXICO

HYMENOCALLIS NAYARITIANA T. M. HOWARD, **SP. NOV.**

Species a H. horsmanni praecociore florente foliis latioribus aspritexturis atriorviridibus floribus jucunde odoratis tubo tepalorum curbato distinguenda.

State of Sinaloa, e. Mazatlan, Mexico. 1964. TRA 1165, 1166 (paratypes); n. of Tepic, Nayarit. 1964. TRA 1167 (isotype), 1168 (type). Fig. 13.

Bulb: small, brown coated, 2-4 cm broad, 4 cm long, globose. *Leaves:* 4-5, 10-19 cm long, 2½-4½ cm wide, narrowly elliptic, sessile to subpetiolate, to petiolate; suberect to prostrate, spreading, acute to subcuspidate, glaucescent. *Scape:* 14-30 cm tall, round in cross-section, umbel 1-5 fld.; *Fls.* white, suberect, tepalsegs spreading, 5.5 cm long, 5 mm wide, florets straight in bud, tepaltube curved slightly at flowering; Odor: slightly sweet smell of new mown grass. *Ovary* sessile, *seeds:* dark dull green, rough textured, sharply angled, 2-3 per capsule, 1 cm long. *Tepaltube:* 5-6 cm long, curved slightly, greenish white near base; *Staminal cup:* funnel shaped with tubulose base, 2 cm long, 2¼-2½ cm wide minutely denticulated between the filaments; *Filaments:* 2 cm long, white at staminal cup base, then becoming green; *Anthers:* 1 cm long, versatile, *pollen* orange colored.

Grown from bulbs collected by T. M. Howard a few miles north of Tepic, state of Nayarit, Mexico on Mexico 15, flowering June 29, 1964, in a mixed colony containing newly emerging plants of *H. horsmanni.* It flowers in San Antonio in May, at least a month in advance of *H. horsmanni,* and it is one of the first of the Mexican alliance to flower. It is one of the dwarfer species in the mexicana alliance. *H. nayaritiana* can easily be distinguished from *H. horsmanni* by its flowering much earlier, its low spreading, broader foliage, more pleasantly sented flowers with curved tepaltubes, and seeds that are fewer in number per pod, and rougher textured and darker green in color. The round stem (cross-section) easily distinguishes it from those having compressed stems. It is common in early summer north of Tepic, Nayarit on the roadside and hillsides, but is difficult to find after flowering as it goes dormant very early, and is overgrown by weeds, whereupon *H. horsmanni* becomes the dominant *Hymenocallis* species in the area. *H. nayaritiana* can flower from very small bulbs (½″) and with *H. graminifolia* comprises one of the smallest members of the mexicana alliance.

HYMENOCALLIS QUERREROENSIS T. M. HOWARD, **SP. NOV.**

Planta foliis glaucis a speciebus similibus in Consanguinitati Mexicanae tubo tepalorum recto distinguenda.

State of Guerrero, Mexico, n. Chilpancingo, 7-24-73. TRA 1174 (type).

Fig. 13. **Hymenocallis nayaritiana** T. M. Howard, **sp. nov.** Photo by James A. Bauml

Collection # 73-27- T. Howard, July 1973 in leaf after flowering. Flowered in San Antonio in early May, 1975 from collected bulbs. Native to mountains of south-central Guerrero, Mex.

Bulb: subglobose, brown coated, ca 5 cm long and 4 cm wide. *Leaves:* 3 to 5, narrowly linear-elliptic, sessile 26 to 35 cm long, 1.5 to 2.5 cm wide at the middle, 0.5 cm wide at the base, acute, glaucous, with

keel. *Scape:* 30 to 35 cm, oval 2-edged, 5 mm wide below the umbel, slightly wider below, *Flowers* white, sweetly fragrant, 1 to 3 in number in few fld umbel. *Spathe valves:* 2 in number, lanceolate, acute, 3 to 4 cm long, 0.5 cm wide at base of umbel, bracteoles slightly smaller. *Flowers:* Tepalsegs: linear acute, 6.5 cm long x 6 mm wide, spreading. *Staminal cup:* rotate, margins spreading, 2 cm long x 3 cm wide, from short tubulose base. *Tepaltube:* straight, greenish in lower ¾, white above; 7.5 cm long. *Staminal cup:* toothed between the filaments; 2 cm long, 1 cm wide at apex. *Filaments:* 2½ to 3 cm long, greenish; *Anthers:* versatile, *pollen* orange-yellow. *Ovary:* sessile. Seed 1.3 cm long x 1 cm wide, smoothe, shiny lt. green. Polyembryonic.

Notes: State of Guerrero, NW of Chilpancingo on road to Puerto el Gallo. *H. guerrcroensis* is named for the state in which it grows. It seems to be endemic to a mountainous area on a new road, west from Mexico 95, n. of Chilpancingo. It is a very early flowering member of the Mexicana alliance with typically small flowered; umbel of flowers having straight tepaltubes. The flowers are sweetly fragrant. Several trips through its habitat in mid July always finds them becoming dormant, and to find them in flower one must go to that area at least a month earlier. It likely flowers with the first rains in that area. *H. guerreroensis,* with its straight tepaltubes, can easily be differentiated from those of the Mexicana alliance having curved tubes, which are more or less similar, such as *H. mexicana, H. durangoensis,* and *H. graminifolia.* The more or less narrow glaucous foliage is another character that easily separates it from other species found in that area. First flowered in cultivation in San Antonio, Texas May 7, 1974.

HYMENOCALLIS DURANGOENSIS T. M. HOWARD, **SP. NOV.**

Species scapo bimarginato foliis sublinearibus vivide viridibus in dimidio superiore spiralibus, tubo tepalorum curvato quam hunc H. mexicanae dimidius longiori distinguenda.

State of Durango, Mexico, e. Durango City, 6-28-64, TRA 1175 (type), TRA 1176 (isotype).

Bulb: globose with blackish-brown skins, ca 5 cm wide and 4 cm long, with short neck. *Leaves:* 5 to 6, sessile, erect, bright green, spiraling in upper half, linear-lanceolate, acute, 2½ cm wide at the middle, narrowing to 1½ cm at the base, 25 to 40 cm long, prominently keeled; deciduous. *Scape:* as long as the leaves, 25 to 40 cm long, ca. 1 cm or more broad at the base in living material, glaucescent, oval in cross section, but distinctly two edged. *Spathe-valves:* (2)-4 to 5 cm long, 4-5 mm wide, lanceolate, acute. *Umbel:* 4 to 12 flowered, white except lower part of tepaltube green, and upper half of filaments and style green. *Tepalsegs:* 6 to 7 cm long, 5 mm wide, linear acute, spreading; florets straight in the bud, *tepaltube* curved in upper 1/3rd on flowering, 6-7 cm long; *Staminal cup:* funnel-shaped from a short tubulose base 2 to 2½ cm long, margins erect, minutely denticulated between the filaments, 2½ to 3 cm wide. *Filaments:* 2-3 cm long above the free portion, green, straight, spreading outward; *Anthers:* 1½ cm long,

versatile, *pollen* orange yellow; *style:* overtopping the filaments; *Ovary:* sessile; *Seeds:* 2 cm long x 1.5 cm wide, lt. dull green, smoothe surfaces. Floral scent: not especially pleasant, chlorox-like.

Notes: Collected in flower June 28, 1964, about 30 miles east of Durango City, Durango, Mexico. on Mexico 40. Endemic in a fertile valley in rich black soil, wet in summer and dry in winter, growing at an elevation of around 6000 feet. Now an endangered species. Fields once abundant with huge colonies of tens of thousands of *H. durangoensis* now have fallen to the plow and grow only food crops, such as corn. One colony was nearly a mile wide and a half mile deep, a sheet of white when it flowered. These are suddenly all gone, never to return again.

H. durangoensis differs from other members of the Mexicana alliance with nearly linear leaves in that the foliage is bright green and spirals in the upper half. The other narrow leaved species have glaucous foliage. The tube of *H. durangoensis* is curved, like that of *H. mexicana,* but is half again longer, and its stem is two-edged rather than round as in *H. mexicana. H. durangoensis* lacks the straight tube of *H. sonoriensis,* and the sweet fragrance of that species. While *H. graminifolia* is relatively few flowered (1 to three, rarely four), *H. durangoensis* has four to twelve flowers with curved tubes.

In cultivation, *H. durangoensis,* given enough moisture in rich soil in full sun, can produce up to three scapes in a single season from largest bulbs. I have chosen to name it for the state of Durango, where it is known to occur as an endemic in one valley about 30 miles East of the capital, between the villages of F. I. Madero and Guadalupe Victoria.

HYMENOCALLIS WOELFLEANA T. M. HOWARD, **SP. NOV.**

Species a speciebus allis in Consanguinitati Mexicanae ovario pedicellato et polline flavo distinguenda.

State of Sinaloa, Mexico, e. Santa Lucia, 6-28-64. TRA 1178 (type).

Bulb: globose, blackish-brown coats, when cut in half, the inner central tunics are white, while the larger outer tunics are colored orange beneath the bulb coats. *Leaves:* petiolate to subpetiolate, 3-6 in number, bright green, thin, keeled, with prominent ribs (2) near margins; oblanceolate to elliptic, acute, 5 to 10 cm wide, 30 to 40 cm long. *Scape:* 33 to 58 cm tall, compressed, 6 mm or more wide at base, glaucescent lt. green. *Umbel* 3-10 fld. *Spathe-valves:* lanceolate, white 4 cm long, 4 to 5 mm wide, becoming vestiges shortly after the scape emerges between the leaf blades and leaving the buds nakedly exposed well before flowering. *Flowers:* white, fragrant, *tepaltube* straight in bud stage, but may be straight or curved on flowering, greenish in lower half, white in upper half, 6 to 7 mm long, *Tepalsegs* 5 to 6.5 cm long, 6 to 7 mm wide, spreading and recurving slightly in outer 1/3rd. *Staminal-cup:* funnel form, crinkled texture, with margins erect or rotate and spreading in some, from short tubulose base, 1½ to 2 cm long and 2½ cm wide. *Filaments:* 2 cm long, white in lower half, greenish in upper

half; *Anthers:* 7 mm long, versatile, *pollen* yellow to orange-yellow. *Ovary:* on 4 mm long pedicles; 2 ovules per cell; *Seeds:* dark green, 1.6 cm long and 1.2 cm broad, with brain-like convolutions, rough, tortoise-shell form.

Notes: H. woelfleana is endemic to the western slopes of the Sierra Madre mountain range in the eastern part of the state of Sinaloa, Mexico, in part shade, at intermediate altitude, in a western sun exposure in Oak and other hardwoods, growing in rich soil with much humus on slopes under trees and along rivulets that intermittantly carry water after each shower during the rainy season. When the rains end in early fall, this area is dry until the summer rains begin again. *H. woelfleana* is a deciduous species with a short growing season and is most closely related to *H. cordifolia* from the state of Guerrero, and likely grows under similar conditions. Both *H. woelfleana* and *H. cordifolia* have been assigned to the Speciosa alliance because of their petiolate foliage and pedicled ovaries. To this we might add their yellow pollens. Pollens of the Mexicana alliance are orange-yellow or orange. Both *H. woelfleana* and *H. cordifolia* have the deciduous habits of the mainstream Mexicana alliance and thus lie midway in many respects between the Speciosa and Mexicana alliances, but leaning toward the former.

The foliage of *H. woelfleana* would easily separate it from the unique foliage of *H. cordata,* and geographically they are widely separated. *H. woelfleana* can be easily distinguished from other members of the Mexicana alliance by not only its yellow pollen, but by the presence of a pedicle below the ovary. The Mexicana group have orange pollen and are sessile. The seeds of *H. woelfleana* are very dark green, shaped like a tortoise, and convoluted in a brain-like fashion, quite different from the Mexicana group. The bulb is unique too. Beneath those blackish-brown outer coats is an orange and white bulb. The central half is the usual white, but the outer half is orange. At first I thought this might be a cultural illness, but I have repeatedly cut into bulbs during many collections, and I find this to be the norm. Unlike most other species, *H. woelfleana* has not shown itself to ever produce offsets, either in the wild or in cultivation. It can only be propagated by seeds. Bulbs cut up for propagation only die.

Since first discovering it in 1964, I have since observed its habitat progressively decimated by agriculture and livestock. It is now an endangered species and likely may become extinct in a matter of a few more years.

I am pleased to name this new species in honor of the late Len Woelfle, former Chairman of the Pancratiodeae committee of the APLS, and *Hymenocallis* breeder. Mr. Woelfle did much to encourage interest of *Hymenocallis* in this country, at a time when they were being largely ignored. He introduced many new *Hymenocallis* hybrids, some of which are now widely cultivated by those few enthusiasts who love them, such as 'Pax', 'Helios', 'Icon', 'Buckeye', 'Dancing Doll', 'Ballerina', and 'Jack Frost'. Len closely kept abreast of my exploration trips and were he alive today, many of the new species that I found would

have been incorporated into his own hybrids.

H. woelfleana is not for everyone. It is very beautiful, but rare and not easy. I can't keep it in the ground, but have had to grow it under greenhouse conditions. It has a short growing season and a long dormant period. It will not tolerate a cold winter situation, even in the lower south. Propagation is only by seed. It loses its roots annually so it can be dug and stored if desired. It makes a fine pot plant.

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THE RECENT CHEMISTRY OF NATURAL PRODUCTS, INCLUDING TOBACCO, edited by Nicholas J. Fina. Phillip Morris, Inc., Research Center, Richmond, Va. 1976. Pp. 176. Illus.—This is the second volume in the series of the Phillip Morris Science Symposia, held on Oct. 30, 1975, in which a number of outstanding research scientists from the United States and Great Britain partcipated. The fields covered included Alkaloid Synthesis; biosynthesis and steriochemistry of terpenoids and steroids; reaction mechanisms in the burning cigarettes; photosynthesis as a resource for energy and materials; isotopic labels in biosynthetic studies, and the Plant Kingdom: a virgin field for new biodynamic constituents.

PYRETHRUM FLOWERS: Third Edition, 1945-1972. Edited by R. H. Nelson. McLaughlin Gormley King Co., 8810 10th Ave., North, Minneapolis, Minn. 55427. 1975. Pp. (i - vi) + 149. Illus.—This is the third in a series on **Pyrethrum** research. It is concerned with the sources of **Pyrethrum** flowers, the chemistry of pyrethrins and pyrethrinoids; the chemical analysis and biological evaluation of pyrethrum; the manufacture of pyrethrum extract; toxicology and pharmaclogy of Pyrethrum extract; and **Pyrethrum** culture. A list of references and an index complete the volume. This book is an indispensible addition to the literature on **Pyrethrum,** and is very highly recommended.

NATURAL HISTORY IN AMERICA, FROM MARK CATESBY TO RACHEL CARSON. By Wayne Hanley. Quadrangle/New York Times Book Co., 3 Park Av., New York City 10016. 1977. Pp. i-xii + 339. Illus. $14.95.—This is a fascinating popular account of the workers in the field of natural history in the United States beginning with Mark Catesby and progressing to the conservation-minded Rachel Carson in recent times. It is highly recommended to all interested in natural history and the conservation movement.

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CONTRIBUTIONS TO SOUTH AMERICAN AMARYLLIDACEAE VII

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ABSTRACT

New species of South American Amaryllidaceae are described. These are: **Stenomesson microstephium, Rauhia staminosa, Urceolina corynandra, Griffinia rostrata, G. aracensis, Habranthus maasii, H. amoenus, H. steyermarkii, H. nullipes, H. leptandrus, Amaryllis curitibana,** and **A. leucobasis.**—The nomenclature of the species improperly known as **Urceolina peruviana** (Presl) Macbr., is cleared up. The seed morphology of the species reveals that its correct placement is in **Stenomesson,** as **S. miniatum** (Herb.) Rav. comb. nov.—**Coburgia splendens** Herb. is restored and transferred to **Stenomesson.—Haylockia cochabambensis** Card. is placed in **Zephyranthes,** as **Z. cochabambensis** (Cárd.) Rav. comb. nov.—**Z. cutleri** Cárd. is recognized as a **Pyrolirion** species, and the new combination **P. cutleri** (Cárd.) Rav. comb. nov., is proposed. In this connection, the fruit and seed morphology is considered as diagnostic at the genus level.—**Zephyranthes stellaris** Rav., and **Habranthus carmineus** Rav., are reported for the first time respectively in the floras of Brazil, and Uruguay.—The new combination **Habranthus microcarpus** (Rusby) Rav. comb. nov. (**Atamosco microcarpa** Rusby), is established.—**Amaryllis curitibana** Rav., sp. nov., from Paraná Brasil; **A. leucobasis** Rav., sp. nov., from Goiás, Brasil; and **A. argentina** forma **rosea** f. nov. Rav., from Tucumán, Argentina, are proposed.

TABLE OF CONTENTS

I. STUDIES IN THE GENUS *STENOMESSON*

A new species and new combinations from Peru and Bolivia are included. The species wrongly known as "*Urceolina peruviana* (Presl) Macbr.," is recognized as belonging to *Stenomesson,* its proper name being *S. miniatum* (Herb.) Rav. A discussion on the identity of *S. coccineum* (R. & P.) Herb., and new synonyms for several species are also included.

1. THE PROPER NAME FOR **URCEOLINA PERUVIANA STENOMESSON MINIATUM** (HERB.) RAV., COMB. NOV. FIG. 14

Pentlandia miniata Herbert, Edwards' Bot. Reg. 25: tab. 68, 1839.—*Spherothele coccinea* Link, Klotzsch & Otto, Icon. Pl. Rar. 2: tab. 38, 1842.—*Urceolina miniata* (Herb.) Bentham et Hooker f., Gen. Pl. 3 (2): 732, 1883.—*Urceolina peruviana* (Presl) Macbride, Field Mus. Nat. Hist. Publ. Bot 11: 11, 1931 (as to the plant described, but not as to name).

This species, since Herbert, has had some important features, and its systematic position, misinterpreted. This author erected for it the genus *Pentlandia* and, mainly because of the supposed lack of a staminal cup, he placed it in the group he called *"Oporanthiformes"*.

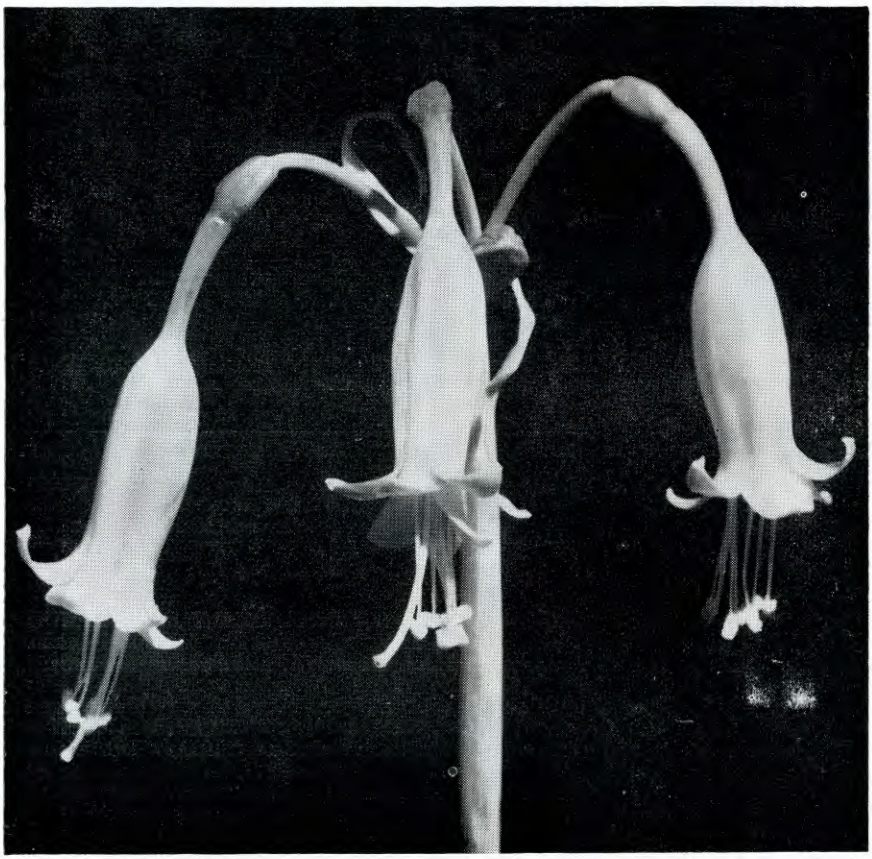

Fig. 14. **Stenomesson miniatum (Herb.)** Rav.; inflorescence; from a bulb collected in the valley of Sorata, Bolivia. Photo P. Ravenna

It must be noted, however, that actually the flower possesses a staminal cup. The latter appears as totally adnate to the concrescent portion of tepals that gives to the perigone its ventricose aspect. It is possible to note six large teeth alternating with the filaments (see Fig. 14). (Diagnostic figure in 1979 PLANT LIFE.)

Bentham & Hooker f. (1883, p. 732), transfered this species to *Urceolina* due to the same misunderstanding of the morphology. Macbride (1931), followed this concept, believing in the existence of a previous epithet in *Spherotele peruviana* Presl, and transferred it to

Urceolina. Two facts induced him to make the mistake: 1. The use by Presl, with a slight variance, of the same genus name proposed by Link, Klotzsch & Otto (1840) for a species that now reveals itself as different. 2. Presl's illustration of *Spherotele peruviana*, based upon a dry specimen, where no cup appears in the detail of the flower.

Some time ago, I obtained on loan the type-sheet of *Spherotele peruviana*, by courtesy of the Národní Muzeum V Praze (Checoslovakia). A flower dissection revealed the existence of a free staminal cup, with six stort teeth alternating with the filaments. This character, along with the size of the ventricose perigone, fits in with *Stenomesson flavum*, a rather frequent species on the coastal hills from Lima to Trujillo, Peru.

The genus *Urceolina*, belonging in the tribe Urceolineae (see Ravenna 1974, p. 71), differs from *Stenomesson*, among other characters, in the few, roundish or ellipsoid seeds in each cell. *Pentlandia miniata* does not produce fruits under culture. Possibly because of some deficiency, the scape, and pedicels, start to dry-up early, preventing the ovary to develop. The fact that wild plants do develop fruits, is demonstrated by the specimens cited here. Personally, I examined plants in flower, and fruit, in the Department of Cajamarca, Peru. The seeds were flat, elliptical-oblong, with membranous edges, like those of *Stenomesson*. On the other hand, the leaves are quite similar as those, for instance, in *S. aurantiacum*, and *S. flavum*, differing from those of the true *Urceolina* species in shape, texture, and less intensity of green. The *Stenomesson* species are, in fact, natives of open areas. The *Urceolina* species, on the contrary, are always found in the rain forest or in shady ravines.

The transference of *Pentlandia miniata*, Herb. to *Stenomesson* seems, therefore, to be well supported.

The species ranges from the Sorata valley, in Bolivia, through the Departments of Cuzco, Apurimac, and Cerro de Pasco, to the region of Cajamarca, in Peru. It varies a little in the northern extreme of its distribution, especially in size, and zygomorphism of flowers. With the exception of Cerro de Pasco, I examined living material in all the mentioned areas, and lately under culture.

Specimens: Peru, dept. Cajamarca, prov. of Chota, above Chota, 2800m leg. Ferreyra 8476, 15-VI-1952, v. n. "moco-moco" (USM), with flowers, capsules, and seeds. Idem, dept. Cerro de Pasco, Paucartambo, 3200m; leg. O. Tovar 1104, 7-VI-1952 (USM). Culta in Bonaria ex bulbis pr. Abancay civit. Apurimac Peruviae collectis; leg. Revenna s/n, IX-1961 (Herb. Rav.). Culta in Santiago Chiliae ex bulbis prope Sorata Boliviae collectis; leg. Ravenna s/n, X-1975 (Herb. Rav.).

2. **STENOMESSON SPLENDENS** (HERB.) RAV., COMB. NOV. FIG. 15

Coburghia splendens Herbert, Amaryll.: 400, 1837.-*C. incarnata* (H.B.K.) Sweet var., Herbert loc. cit.: 400, 1837.

This distinct species has hitherto been mistaken in the herbaria,

and the literature, as *S. variegatum* (R. & P.) Herb. In a recent article by E. T. Di Fulvio (1973), on the caryology of some Amaryllidaceae, the species appears as *S. variegatum*. The latter has broader leaves, and flowers about twice as long ("spithameis", according to Ruiz and Pavón).

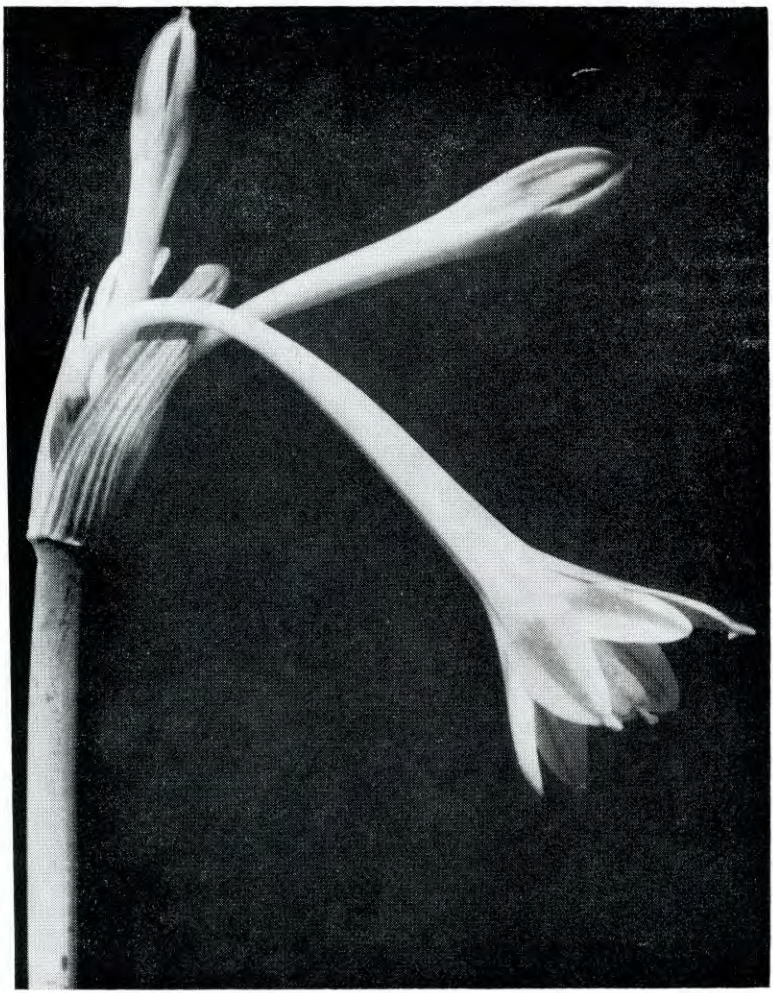

Fig. 15. **Stenomesson splendens** (Herb.) Rav., as photographed in the mountains of Calla-calla, Dept. of Cajamarca, Peru. Photo P. Ravenna

The original figure, by the hand of Herbert, shows the flowers as erect, as they are in the type material, but this was the result of pressing the latter in an improper position. Although rather variable in size and color, the flowers are always cernuous or declined.

Specimens: Peru, dept, Amazonas, prov. Chachapoyas, arriba de Leimebamba, 2700-2800 m, monte bajo; leg. R. Ferreyra & C. Acleto 15274, 20-VIII-1963 (USM, Herb. Rav.). Idem ibid Cerros Calla-Calla, east side, 5 km above Leimebamba, on the road, at San Miguel, 2400 m; leg. P. C. Hutchison & D. E. Bennett 4540, 26-III-1964 (USM, UCAL, US, F. NY, MO, K). Idem ibid, 8 km above Leimebamba; leg. P. C. Hutchison & J. K. Wright 5652, 13-VI-1964 (USM, UCAL). Idem ibid; leg. Ravenna et Díaz Celis 2092, 5-VII-1973 (Herb. Rav.). Idem, Leimebamba-Balsas, Jalca de Calla-Calla, 2800 m; leg. Sagástegui, 23-X-1965 TRP 6055). Dept. Cajamarca, Llama, 2200-2700 m; leg. F. W. Pennell, 17-VII-1948 (USM). Idem, Cutervo, 2700-2800 m; leg. R. Ferreyra, 24-VIII-1963 (USM). Idem, between Cutervo and Cochabamba; leg. R. Ferreyra & E. Acleto 15348, 24-VIII-1963 (USM). Dept. La Liberstad, prov. Huamachuco, Hda. Yanazara, 2800 m; leg. F. Pinillos, 26-III-1961 (TRP 3656). (?). Cult. in Mus. Javier Prado; leg. R. Ferreyra, 14-IX-1971 (USM).

3. ON THE IDENTITY OF **STENOMESSON COCCINEUM**, AND **S. RUBRUM**

Since they were described, respectively by Ruiz and Pavón and Herbert, the identity of *Stenomesson coccineum* and *S. rubrum* have been obscure. Subsequent authors in all cases attributed the former binomial to wrong material. This actually belonged in *S. breviflorum, S. flammidum,* or even in *S. flavum.* Concerning *S. rubrum,* it has inadequately been referred to *S. coccineum.* The latter species appears now as destitute of synonymy.

4. **STENOMESSON COCCINEUM** (RUIZ ET PAV.) HERB. (SYNONYMA EXCL.)

Herbert, Append.: 40, 1821.- *Pancratium coccineum* Ruiz et Pavon, Fl. Peruv. et Chil. 3: 54, 1802 (excl. tab. 285).- *Coburgia coccinea* (Ruiz et Pav.) Herbert, Curtis' Bot. Mag. 67: sub tab. 3865, 1841.

A photograph of the holotype of *Pancratium coccineum* Ruiz et Pav. (at Madrid), reveals that it actually differs considerably from the illustration that accompanies the original description of the species. This was already observed by Herbert (1837, p. 199), when examining an isotype at the British Museum. He thought the figure to be a representation of a specimen labelled by Ruiz and Pavon as *"Pancratium rubrum"*, and the specimen of *P. coccineum* "a *Phycella* allied to *graciliflora*". This is correct concerning the figure, which truly corresponds to the specimen mentioned. The holotype, however, and probably the isotype too (at BM), is not a *Phycella* but a true *Stenomesson,* apparently belonging in subgenus *Fulgituba.* The linear-ensiform leaves, flower shape, and relatively short filaments (not protruding from the perigone), support this conclusion. The sheet is misdetermined by Krause as *Eustephia coccinea* Cav.

The specimen labelled *Pancratium rubrum* Ruiz et Pav. (BM, type of *Stenomesson rubrum* Herb.), actually represents *Stenomesson flavum* (Ruiz et Pav.) Herb. In this species the perigone varies from yellow to a bright orange. After the flowers are pressed, the latter

color turns red.

What is then *Pancratium coccineum* R. & P. . . ., and which circumstances caused the misdesignation, as this species, of plate 285 of the Flora Peruviana et Chilensis

Looking through the Amaryllidaceae of the Museo Javier Prado of Lima, three sheets from the coastal hills of Lachay, Lupin, and Chancay, strongly attracted my attention. They represented a *Stenomesson* species, of subgenus *Fulgituba;* the first instances of this group occurring in the "lomas" area. The plants looked rather familiar in general appearance, and, after an accurate examination, their identity with *P. coccineum* was ascertained. Some other sheets from the same places belonged in *Stenomesson flavum* (R. & P.) Herb.

It is known that Ruiz and Pavón, with their expedition-staff (artists included), explored the mentioned hilly areas. It is easy then to imagine the collectors gathering there the material lately described as *P. coccineum,* and also the specimens that would be labelled as *P. rubrum,* a binomial that they never published.

Plate 285 of the Flora Peruviana et Chilensis, named as *Pancratium coccineum,* was certainly based upon an already pressed specimen of *P. flavum.* The position of tepals, appearing as contiguous and hiding the staminal cup, support this assumption. In the fresh flowers they are spreading, and the staminal cup is rather apparent and prominent. *P. flavum* is properly illustrated, based upon living material, under plate 284 of the same work.

Years ago (see Ravenna, 1971), I included *Stenomesson peruvianum* Traub under synonymy of *S. coccineum.* The binomial appears now to be a synonym of *S. breviflorum* Herb.

The locality "Tarma", cited by Ruiz and Pavón for *P. coccineum,* was certainly a mistake. Not far from this town, and rather frequent in the whole region, another red-flowered species, *S. breviflorum,* is found. The latter circumstance probably caused the confusion.

All the sheets from Ruiz and Pavón that I have examined, in photograph, deposited in the Instituto Cavanilles (M), British Museum (BM), and Instituto Botanico dell 'Universitá (FI), Florence, bear no locality data. The set from the latter institution, even lack any identification. This leaves ground to assume that a number of the quoted localities in the Flora Peruviana et Chilensis, may be incorrect. A clear instance is found in the *Alstroemeria* species there treated.

Specimens of *S. coccineum:* Perú, dept. of Lima, prov. Chancay, Chancay, loma pedregosa, 300 m; leg. R. Ferreyra 8731, 24-IX-1952 (USM, UCAL). Idem, prov. Chancay, lomas de Lachay, about 90 km N of Lima, and nearly 4 km E of Panamerican highway, 250 m, (fl. orange); leg. R. Ferreyra 191, 12-X-1945 (USM). Idem, cerca de Lupín, loma seca, 350 m; leg. E. Cerrate 797, 12-XI-1950 (USM, Herb. Rav.).

5. NEW SYNONYMS FOR **STENOMESSON RECURVATUM**

Stenomesson recurvatum (R. & P.) Bak.

Baker, Saunders' Refug. Bot. 5: sub tab. 308, 1872.- *Pancratium recurvatum* Ruiz et Pavón, Fl. Peruv. et Chil. 3: 54, tab. 285, f. a, 1802.- *Carpodetes recurvata* (Ruiz et Pav.) Herbert, Append.: 41, 1821.- *Clitanthes macleanica* Herbert, Edwards' Bot. Reg. 25: Misc. 87, 1839.- *Coburgia macleanica* (Herb.) Herbert, loc. cit. 28: Misc. 55, 1842.- *Coburgia langensis* Herbert, loc. cit. 28: Misc. p. 53, 1842.- *C. obragillensis* Herbert, loc. cit. 28: Misc. p. 53, 1842.- *Stenomesson longifolium* Kraenzlin, Engler Bot. Jahrb. 40: 238, 1908.- *S. ferreyrae* Traub, Pl. Life 6: 95, 1950.- Pro syn.: *Coburgia laeta* Herbert, Edwards' Bot. Reg. 28: Misc. p. 53, 1842 (nomen subnudum).

Stenomesson recurvatum, of subgenus *Carpodetes* (Herb.) Tr., is remarkable by its one-valved spathe. The species inhabit mainly certain valleys in the Andes of the Lima department, Peru. In the Rimac Valley it reaches an altitude of 3500 m over the Sea.

Coburgia leata Herb. is a nomen subnudum, which may be referred to *S. recurvatum.*

Coburgia discolor Herb., discovered by Feuillée in South Peru, agrees with *S. recurvatum.* There is some material, in the Museum of Lima, collected in the department of Arequipa, which is identifiable with the figure of Feuillée (1725). The latter author collected the species in some of the coastal hills in the Moquegua Department. The notable distance that separates the populations of the Andes of Lima, from the southern plants, cannot be explained so far satisfactorily.

There is the slim possibility that *S. coccineum* and *S. recurvatum* are a single species. If this is proved from living material, the latter binomial should be chosen in orden to avoid any additional confusion. On the other hand, the origin, and identity, of *S. luteum* (Ruiz et Pav.) Bak. is still rather obscure.

Stenomesson incarum Kraenzl., originally collected in the "lomas" of the department of Arequipa, seems to be this same species.

I found fruiting plants on the top of the Rimac valley, above San Mateo, and at Llacshishi, on the mountains above Surco, both locations in the department of Lima.

Specimens: Peru, dept. Lima, Pacatulpe; leg. C. A. Redoutt, XII-1944 (USM) 14647. Idem, prov. Lima, abajo de Canta, 2400-2500 m; leg. R. Ferreyra 8914 & 8920, 15-I-1953 (USM, Herb. Rav.). Idem, Canta; leg. C. Acleto 58, 21-II-1960, v. n. "cichi-hica" (USM, Herb. Rav.). Idem, Monte Zárata, arriba de San Bartolomé, 2800 m; leg. R. Ferreyra s/n, 19-III-1960 (USM). Idem, prov. Huarochirí, San Pedro de Huancaire, 3100 m; leg. E. Solar Bustamante, 15-I-1953 (USM, Herb. Rav.), v. n. "china-huaita". Idem, Río Blanco, 3400-3500 m; leg. R. Ferreyra 14858, 21-I-1963 (USM). Idem, cerca de Río Blanco, ladera pedregosa, 3400-3500 m; leg. R. Ferreyra, I (USM). Idem, Infiernillo, entre San Mateo y Casapalca, 3300-3400 m; leg. R. Ferreyra s/n, 17-I-1949 (isotype of *S. Ferreyrae* Traub? USM). Idem, prov.

Yauyos, cerca de Tupe, 2800 m; leg. E. Cerrate 1281 (USM). Idem, Dept. Arequipa, near lomas de Chaparra between Chala and Atico, 200-300 m; leg. R. Ferreyra 1474, 19-X-1946 (USM). Idem, lomas cerca de Chala, camino a Chaparra, 500-600 m; leg. R. Ferreyra 11442, 10-X-1955 (USM). Cultivated; leg. R. Ferreyra s/n, 27-V-1948 (USM).

6. **STENOMESSON STRICKLANDII** BAK., AN ADDITIONAL SYNONYM FOR **S. AURANTIACUM**

Three different binomials *S. eustephioides* Herb., *S. hatwegio* Lindl. and *S. suspensum* Bak., were already listed under synonymy of *S. aurantiacum* (H.B.K.) Herb. (see Ravenna 1971, p. 83). To these I have to add now *stricklandii* Bak. The latter was imported by Sir C. W. Strickland of Yorkshire, from Quito, Ecuador. A photograph of the type-sheet, kindly sent from Kew Gardens, shows two scapes in flower, and another with a mature capsule already without seeds. Another photograph shows additional material of two scapes in flower, sent a year later to Baker by the same gentleman. The specimens can readily by identified as *S. aurantiacum,* which is the only species of the genus, apart from *S. incarnatum,* that is found near Quito. On the other hand, Baker's original description of *S. stricklandii,* and the generic one of *Stricklandia,* match completely with *S. aurantiacum.*

Baker (1888), transfers *Leperiza eucrosioides* Bak. to his new genus *Stricklandia,* listing *Stenomesson stricklandii* as a synonym. A phototype of *L. eucrosioides* shows what seemingly is a young inflorescence of a *Phaedranassa,* or possibly of an *Eucrosia.* The curved, although relatively short filaments, seem to support the latter appraisal. Bentham & Hooker f. (1883), transferred *L. eucrosioides* to *Phaedranassa* (see also Ravenna 1969 p. 61).

Specimens: Cultivated by Sir C. W. Strickland of Yorkshire, England, VI-1882 (phototype from K). Ex horto Sir C. W. Strickland, VI-1883 (photograph from K).

7. A NEW SPECIES FROM NORTH PERU

Stenomesson microstephium Rav., sp. nov.
(subgeneris Fulgituba) (Fig. 16.)

Species a *Stenomesso splendenti* proxima sed foliis canaliculato-convolutis pedicellis bene evolutis floribus minoribus staminibus et pocula staminali breviores differt.

Planta usque 12-30 cm alta. Folia serotina linearia vel linearia-angustata crassiuscula cinereo-viridia pruinosa ad 15-35 cm longa circ. 6-11 mm lata. Spatha bivalvata 35-45 mm longa; valvae deciduae ad basin liberae. Inflorescentia 7-10 flora. Pedicelli 18-35 mm longi. Flores aurantiaci vel coccinei declinati vel penduli rarissime horizontales 40-45 mm longi circ. 9-11 mm lati. Perigonii tubus et pars concrescens tepalorum circ. 20-30 mm longum. Tepala lanceolata, exteriora marginibus involutis ad 17-19.5 mm longa circ. 4-4.5 mm lata ad dorsum distincte viridi-tincta raro concolora. Tepala interiora acuta interdum pallidiora ad 17 mm longa circ. 4.6 mm lata. Pocula staminalis perbrevis saepe

usque 2 mm longa circ. 3.5 mm lata dentibus sex triangularibus instructa. Filamenta filiformia albolutescentia vel sordide albo-rosea, sepalina 1.5-2.5 mm longa, petalina 4-5.3 mm longa. Antherae aellypticae 3-3.9 mm longae; pollen luteus. Stylus 43-44 mm longus ultra stamines rubescens inferne albicans. Stigma capitatus. Capsula tricoccoglobosa ad 15-18 mm lata. Semina compressa aellyptica nigra.

Fig. 16. **Stenomesson microstephium** Rav., inflorescence from a bulb collected at Jelic, Dept. of Cajamarca, Peru. Photo P. Ravenna

Plant up to 12-30 cm high. *Bulb* ovoid, 4-5 cm long, 30-45 cm wide, prolonged into a 4-9 cm long pseudo-neck; outer dry tunics breakable, a rather shiny dark brown. *Leaves* 2-3, serotinous, linear or linear-angustate, often markedly channeled, subcarinate, subacute, somewhat

fleshy, ash-green, 15-35 cm long, 6-11 mm broad. *Scape* compressed, 9-35 cm long, 5-7 mm broad. *Spathe* bivalved, marcescent, 35-45 mm long, its valves subequal, free to the base, often deciduous. *Umbel* 7-10-flowered. *Pedicels* 18-35 mm long. *Ovary* obovate, trigonous, green, tinged red at the apex, 5.5 mm long, 4.2 mm wide. *Perigone* declined or nodding, very rarely horizontal (?), 40-45 mm long, 9-11 mm wide, scarlet or orange tinged dirty green at the apex of tepals; *perigone-tube* and concrescent part of tepals not clearly distinguished. *Tepals* lanceolate; the outer with incurved edges, 17-19.5 mm long, 4-4.5 mm broad, with a diminutive tubercle at the apex, the greenish area being more distinct on the abaxial face. Inner tepals paler, with less incurved edges, up to 17 mm long, 4.6 mm broad, acute. *Staminal cup* very short, pale-red, 2 mm long, 3.5 mm in diameter; teeth six, deltoid, alternating the filaments. *Filaments* filiform, yellowish-white or a dirty pinkish-white; episepal 1.5-2.5 mm long, epipetal 4-5.3 mm long. Anthers elliptical, not distinctly versatile, 3-3.9 mm long; pollen yellow. *Style* 43-44 mm long, reddish above the stamens, whitish below. *Stigma* capitate. *Capsule* globose-tricoccous, 15-17 mm wide. *Seeds* compressed, elliptic, black. (Diagnostic figure in 1979 PLANT LIFE.)

Habitat.—Rocky slope called Jelic, in the department of Cajamarca, Peru; apparently also on the west side of the mountain belt of Calla-Calla; altitude: 2000-2700 m over the sea.

Specimens: In ditione Jelic civit. Cajamarcae Peruviae; leg. Ravenna 2096, cum Díaz Celis, 6-VII-1973 (typus in Herbario Ravennae). Idem ibid. Jelic (Celendín-Balsas), 3100 m; leg. Sagástegui, 5-V-1970 (TRP 7401). Idem ibid., 4 km east of Celendín, on road to Balsas; leg. P. C. Hutchison & J. K. Wright 5180. 19-V-1964 (USM). Idem, Cerros Calla-Calla, west slopes, gorge of Río Marañón, 23 km above Balsas, on the road to Leimebamba, Km 362; leg. P. C. Hutchison & W. Krahn 4972, 8-V-1964 (USM, TRB, UC).

Stenomesson microstephium appears as related to *S. splendens* (Herb.) Rav. The main distinguishing features are found in the well developed pedicels, smaller flowers, and very short staminal-cup and stamens.

II. A NEW *RAUHIA* SPECIES FROM THE DEPARTMENT OF AMAZONAS, PERU

Rauhia staminosa Rav., sp. nov. Fig. 17.

A *Rauhia multiflora* foliis aellyptico-acutis petiolo obscuro vel breviori filaments ex perigonio longe productis differt.

Plant up to 1 m high. *Bulb* globose, 8-10 cm wide, the outer-coats cartilagineous, a pale brown; pseudoneck short. *Leaves* elliptic or elliptic-oblong, subacute, broadly channelled, succulent, rather fragile, about two at anthesis, 15-30 cm long, 9-15 cm broad; the petiole short, often subterraneous. *Scape* cylindric, pruinose, up to 40-80 cm long, 7.5-12 mm thick above, embraced at the base by two, often not completely developed leaves. *Spathe* bivalved, marcescent; valves lanceo-

late, 32-40 cm long. *Umbel* 8-24-flowered. *Pedicels* cylindric, ascending or obliquely spreading, pruinose, ash-green, about 40-90 mm long. *Flowers* declined. *Ovary* ellipsoid, obtusely trigonous, ash-green, up to 9-11 mm long, 5-6 mm broad. *Perigone* ash-green, 50-60 mm long, 23-31 mm in diameter above. *Perigone-tube* infundibulate, about 14-17 mm long, the tepals then connate for 19-25 mm. *Tepals* lanceolate or oblanceolate, their margins maitish in the lower half, greenish-yellow, or even whitish upwards, a white streak within; the outer 20-23 mm long, 7 mm broad, minutely apiculate-tubercled; the inner narrowly obovate, their margins slightly weavy, up to 18-21.5 mm long, 9.5-10.5 mm broad. *Filaments* whitish or greenish-white, the upper episepal 46-50 mm long, lateral episepal pair 54-63 mm long, lower epipetal 61-64 mm long, lateral epipetal pair 62-65 mm long. *Anthers* elliptic-oblong, yellow, up to 2.8-3.4 mm long. *Style* 64-80 mm long, green. *Stigma* capitate, 1.2-1.9 mm broad. *Capsule* broadly pyramidate-tricoccous, trilobate below, ash-green, pruinose, 30-40 mm in diameter. *Seeds* flat, black, elliptical.

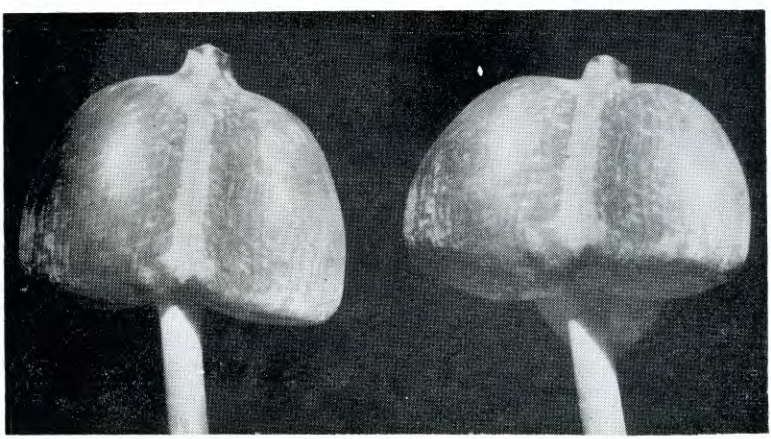

Fig. 17. **Rauhia staminosa** Rav., two different views of capsule. Photo P. Ravenna

Habitat.—Slopes above the Utcubamba river, especially between Bagua and Tingo, on the way to Chachapoyas, dept, of Amazonas, Peru. It sometimes grows among round stones, near the river banks, or among bushes in dry open woods. The region is a very warm one, with copious rains during June, July, and August, and possibly also in the rest of the year. The plants flower during the three months mentioned.

Specimens: Circ. 8 km ad meridionem Bagua ad viam Chachapoyas civit. Amazonas Peruviae; leg. Ravenna 2091, 3-VI-1973 (typus in Herb. Ravennae).

This is the second species of a remarkable genus. *Rauhia multiflora* (Kth.) Rav., the type-species, inhabits the warm valley of another tributary of the Marañón river, in the department of Cajamarca. The exceedingly long stamens is the most striking character that distinguish the new species. (Figure, flowering plant, in 1979 PLANT LIFE.)

III. A NEW *URCEOLINA* SPECIES FROM NORTH PERU

URCEOLINA CORYNANDRA RAV., SP. NOV. (SUBGENERIS **EUCHARIS**) (FIGS. 18 AND 19)

Species a *U. narcissiflora* proxima sed pocula staminali dimidio breviore filamentis obtuse clavatis antheris minoribus differt; caeteris speciebus ex caracteres longe absunt.

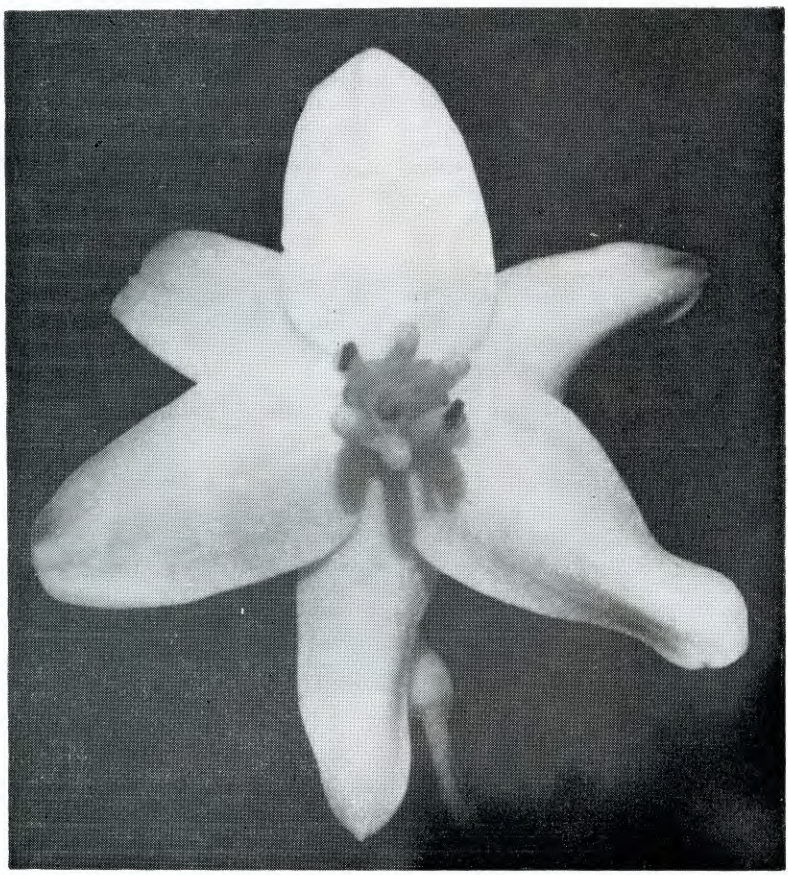

Fig. 18. **Urceolina corynandra** Rav., upper view of flower, as photographed in the type locality. Photo P. Ravenna

Inflorescentia 4-12-flora. Flores distincte pedicellati; perigonii tubus ringens ad 16-27.5 mm longus; perigonium circ. 37-59 mm latum. Pocula staminalis lutescens vel luteo viridescens ad 3.5-4 mm longa dentis singulis inter filamenta instructa. Filamenta crassa perfecte clavata longiora usque 8 mm longa. Antherae versatiles nigricantes dense pubescentes ad 2.9 mm longae. Stigma capitatus.

Plant up to 35-56 cm high. *Bulb* globose covered with brown coats, 35-40 mm in diameter. *Leaves* long petioled, of a dark, shiny green, paler beneath, up to 40-59 cm long; petiole almost cylindric or slightly compressed, 15-39 cm long; blade lanceolate or ovate-lanceolate, acute, up to 13-29 cm long, 5-10 cm broad. *Scape* cylindrical, up to 2768 cm long, 1.9-4.4 mm thick at the apex, 4.7-8 mm at the base. *Spathe* bivalved, marcescent; valves lanceolate, up to 20-40 mm long. *Umbel* 4-12 flowered. *Pedicels* cylindrical-filiform, spreading obliquely, 11-43 mm long. *Ovary* in the same line as the pedicel, ovoid, a pale green, yellowish-green at the apex, up to 4.5-7 mm long, 2.9-4.1 mm broad. *Perigone-tube* nodding or curved, white, up to 16-27.5 mm long, 1.7-2.2 mm broad. *Perigone* white, 37-59 mm in diameter. *Tepals* lanceolate, spreading horizontally, or moderately reflexed from their base; the outer 19-33 mm long, 8.4-11.3 mm broad, very minutely apiculate; apicule 0.2-0.25 mm long; the inner ovate-lanceolate, subacute, 18.4-33 mm long, 11.5-15.5 mm broad. *Staminal cup* infundibulate, rather thick in texture, yellowish or greenish-yellow, with six obtuse teeth alternating with the filaments, up to 3.5-4 mm long, 6-6.8 mm in diameter. *Filaments* club-shaped, white, slightly shining; episepal 6-7 mm long, epipetal 6.4-8 mm long. *Anthers* versatile, linear-oblong, densely pubescent, blackish, about 2.9 mm long. *Style* filiform, white, up to 30-44.5 mm long. *Stigma* capitate.

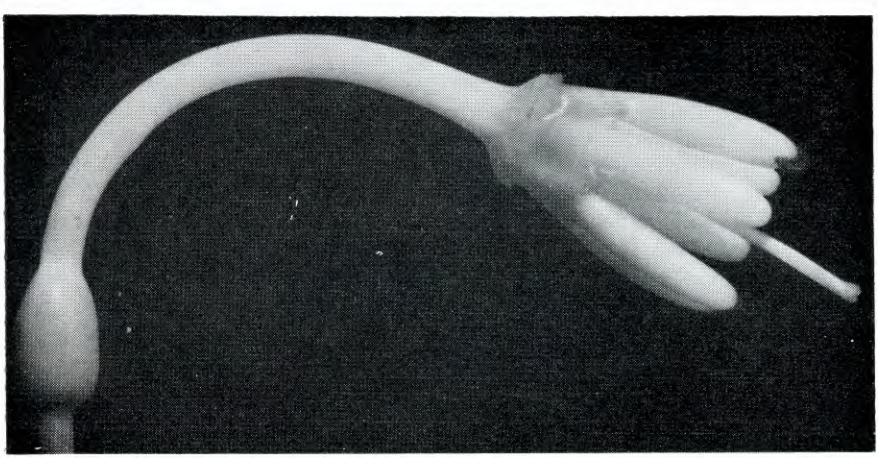

Fig. 19. **Urceolina corynandra** Rav., flower with tepals removed, showing androecium and gynoecium. Photo P. Ravenna

Habitat.—Tropical forest, on slopes, near a small ravine with *Diefenbachia* sp., *Helyconia* sp., *Clusia* sp., and *Xyphidium coeruleum* Aubl., at Chinganza, in the department of Cajamarca, Peru.

Specimens: Chinganza inter Aramango et Montenegro civit. Cajamarca Peruviae; leg. Ravenna 2090, 2-VII-1973 (typus in Herb. Rav., isotypi K, NY, TRA).

This pretty species is closely related with *Urceolina narcissiflora* Huber. Its distinctive characters are found in the staminal cup, which is shorter by half, the club-shaped, not at all subulate filaments, and the smaller, markedly versatile, pubescent anthers. Both species are, in other respects, rather similar.

The natural enviroment of the species is found in a new colonization area. No doubt that the destruction of the forest will seriously affect its permanence in the future.

IV. NEW SPECIES IN THE GENUS *GRIFFINIA*

GRIFFINIA ROSTRATA RAV., SP. NOV.

Species peculiaris a caeteris speciebus perigonii tubo duriusculo supra fructum persistenti distincta.

Folia petiolata crassiuscula usque 43-48 cm longa; clamina acuta circ. 45-60 mm lata. Inflorescentia pauciflora. Pedicelli fructiferi erecto-patentes. Fructus obovato-aellypticus e perigonii tubum persistentem circ. 10-12 mm longum rostratus ad 33-42 mm longus circ. 25-28 mm latus. Semina dua vel tria per loculum subpyriformia ad 11 mm longa circ. 8-9 mm lata ab arilo carnoso notata.

Plant up to 35-40 cm high. *Bulb* thick (acc. to the collectors), whitish, prolonged into a pseudoneck. *Leaves* petioled firm-textured, up to 43-48 cm long; petiole 10-20 cm long; the blade obovate-oblanceolate, acute, 45-60 mm broad. *Scape* 27-28 cm long. *Umbel* 3-flowered. *Pedicels* of fruits erect, about 15-27 mm long. *Capsule* green, obovate-elliptic, rostrate due to the persistent perigone tube on its apex; beak 10-12 mm long. *Seeds* 2-3 in each cell, subpyriform, fleshy, reddish in the herbarium, bearing a thick unilateral aril, up to 11 mm long, 8-9 mm wide.

Specimens: Brazil, Mato Grosso, Vale dos Sonhos, ca. 93 km from Xavantina, on Aragarças road, evergreen forest; leg. Harley et al. 10975, 9-XI-1968 (type UB, isotype K).

The amazing features of fruit, and seeds, suggest that also the flowers could bear some peculiar feature. It is therefore unfortunate that only fruiting plants were found by the collectors.

GRIFFINIA ARACENSIS RAV., SP. NOV. SEE PLANT LIFE 30: 69, 1974

A *Griffinia parviflora* qui specie Bahiensi foliis angustioribus cinereo-maculatis differt. *G. liboniana et rochae* ad speciem nostram valde similes sed staminibus quinque habent.

Planta ad 15 cm vel infra alta. Folia oblanceolato-petiolata usque 7-18 cm longae; petioli circ. 5-9 cm longi; lamina fusco-viridia cinerreo-maculata ad 7.5-25 mm lata. Pedicelli 10-17 mm longi. Flores usque 13-25 mm longi circ. 22-30 mm lati. Tepala anguste oblanceolata ad 19-22 mm longa praeter interiori-inferius qui angustius caetera circ. 2.5-2.8 mm lata.

Plant up to 15 cm high, or less. *Leaves* six, oblanceolate petiolate, 7-18 cm long; petioles 5-9 cm long; blades a dark green, variously spotted

with grayish-white or grayish-green, acute, 7.5-25 mm broad. Scape 7.2-12 cm long. *Spathe* bivalved, membranous, hyaline; valves often unequal, broadly lanceolate, ventricose, 11-23 mm long, connate toward the base for 3-5 mm, abruptly narrowed upwards. *Umbel* 4-7-flowered. *Pedicels* 10-17 mm long. *Perigone* horizontal, 13-25 mm long, 22-30 mm in diameter. *Tepals* narrowly oblanceolate, whitish in the lower half, lilac above, 19-22 mm long, excepting the lower inner, which is narrower, the rest 2.5-2.8 mm broad, the outer series distinctly apiculate; apicule ca. 0.8 mm long, puberulent on the inner half. *Filaments* thin, filiform, ranging from 10 to 15 mm in length, declinate, flexuose, not closely fasciculate, the upper episepal ascending. *Anthers* almost falcate 2.5 mm long. *Style* declinate, prominent, up to 22 mm long. *Stigma* minutely capitate.

Specimens: Brazil, Minas Gerais, Serra dos Aracás near (Matozinhos); leg. E.P. Heringer 72-40, 26-X-1959 (typus UB).

The species was already proposed by me in volume 30, p. 69 of this journal. Unfortunately, due to the ommision in print of the last part of the text (including the specimen paragraph), the species was invalidated.

In its small habit, the species approaches to *G. itambensis* Ravenna (1974, p. 68), differing in the narrower, grayish-spotted leaves, and smaller flowers. *G. rochae* Morel (see fig. 20 in vol. 30 of Plant Life) is also a small species; it is separable from our plant on account of the shortly petioled, non-spotted leaves, and the lack of the upper episepal stamen.

V. STUDIES IN *ZEPHYRANTHES*

Haylockia cochabambensis is tranferred to *Zephyranthes*. *Z. stellaris* is reported for the first time in Brazil

1. **ZEPHYRANTHES COCHABAMBENSIS** (CARD.) RAV., COMB. NOV.

Haylockia cochabambensis Cárdenas, Pl. Life 29: 44, 1973.—Pro syn. *Zephyranthes challensis* Ravenna, Pl. Life 30: 39, 1974.

Zephyranthes challensis apparently is a synonym of the present species. Due to an unfortunate circumstance, volume 29 of Plant Life was lost in transit to me. The description of Cárdena's *Haylockia cochabambensis* was unknown to me until volume 30 of this journal, where *Z. challensis* appeared, already issued.

It was already stated (see Ravenna, 1971) that *Haylockia* must be regarded as a synonym of *Zephyranthes*. *Z. cochabambensis* furnishes additional evidence on this respect. In fact, this species sometimes developes a short, although distinct scape above the ground (see Pl. Life 30, fig. 11), approaching to subgenus *Zephyranthes*.

2. **ZEPHYRANTHES STELLARIS**, REPORTED IN THE BRAZILIAN FLORA

Among some material collected by G. Hatschbach in Mato Grosso, Brazil, a *Zephyranthes* species seemed rather familiar. A close examination revealed that it represented *Z. stellaris* Rav., hitherto reported for

Argentina, and Paraguay (see Ravenna, 1967). Another rather old Brazilian specimen, is found in the Instituto Darwinion of San Isidro, Argentina. This was collected between Alegrete and Capivarí, Río Grande do Sul, and bear the annotation "flores amarillas" (yellow flowers), which probably is a mistake.

The range of the species is therefore extended to the east, in Río Grande do Sul, and to the north, at 19° 10' S, in Mato Grosso, Brazil.

Specimens: Brazil, Mato Grosso, Serra de Urucum, "lajeados da base dos morros"; leg. Hatschbach & Cheres 30447, 13-IV-1972 (Herb. Rav., Herb. Hatschbach). Río Grande do Sul, Alegrete a Capivarí; leg. E. Nicora SI).

Additional specimens for Argentina and Paraguay: Argentina, prov. Santa Fe, dept. Gral. Obligado, Lauteri; leg. Maldonado-Bruzzone 1665, 8-XII-1945 (LP). Prov. Chaco. Colonia Resistencia; leg. ? (LPS at LP). Paraguay, orilla izquierda del río Tabicuary, cerca de Villa Florida; leg. Balansa (?) 19510 (LPS at LP). Idem, Hiasi; leg. Joergensen 3877, March (SI).

VI. STUDIES IN THE GENUS *PYROLIRION*

1. **PYROLIRION CUTLERI** (CARD.) RAV., COMB. NOV.

Zephyranthes cutleri Cárdenas, Pl. Life 29: 38, fig. 11, a & b, 1973.

The perigone shape, and the existence of three, spoon-like stigmas, along with the characters of capsule, and seeds (see below), are reasons for transfering the species to *Pyrolirion*.

2. ADDITIONAL CHARACTERS FOR DISTINGUISHING **PYROLIRION** FROM **ZEPHYRANTHES**

The morphology of capsule and seeds, for the purpose of distinguishing *Pyrolirion* from *Zephyranthes*, has so far been overlooked.

Cárdenas (1971, p. 40, figs. 13 & 14) describes, and illustrates for the first time, the capsule and seeds of *P. boliviense* (as *P. xyphopetalum*). Later (se Cárdenas 1973), he describes, and illustrates, those of *P. cutleri* (as *Zephyranthes cutleri*), giving strength to the position assumed here, that their shape is a constant feature in the genus.

KEY TO **ZEPHYRANTHES** AND **PYROLIRION**

1a. Stigmatose area covering the whole upper part of a true trifid stigma. Capsule depressedly globosetricoccous, wider than long, deeply trivalved at maturity. **Seeds not winged** ..... **ZEPHYRANTHES**

1b. Stigmatose area at the apex of three, conduplicate, flattened styly arms. Capsule elliptical-oblong, longer than wide, not distinctly tricoccous, opening in the upper third or half. **Seeds with a whitish unilateral wing.** ..... **PYROLIRION**

P. tubiflorum never produces fruits under culture, and apparently nor even in wild state; hence the reason that they were not described. The species propagates by means of bulblets, that the plants produce in great number similarly as in *Nothoscordum inodorum* of the Alliaceae.

VII. STUDIES IN THE GENUS *HABRANTHUS*

1. FOUR NEW SPECIES AND A NEW COMBINATION

HABRANTHUS MAASII RAV., SP. NOV.

Planta usque 17-30 cm alta. Folia ad anthesin incipientia linearia ad 9-10 cm longa circ. 2 mm lata. Scapus 9.5-19 cm longus. Spatha uniflora usque 21-39 mm longa superne bifida. Pedicellus circ. 27-56 mm. longus. Flos cernuus roseus ad 46-68 mm longus circ. 24-32 mm latus. Tepala oblanceolata ad 4-5 mm inferne connata ad 4-6 cm longa. Filamenta declinato adscendentia, sepalinum superius 5-8 mm longum sepalina lateralia 9-17 mm longa petalinum inferius 5-8 mm longum petalina lateralia 18-28 mm longa. Antherae falcatae circ. 3-7 mm longae. Stylus declinatus ad 30-35 mm longus. Stigma trifidus lobis arcte recurvatis ad 4-6 mm longis.

Plant up to 17-30 cm high. *Bulb* unknown, but from the remnants in the specimen, prolonged into a pseudo-neck. *Incipient* leaves linear, 9-10 cm long, 2 cm broad. *Scape* seemingly robust, 9.5-19 cm long. *Umbel* one-flowered, membranous tubular for 15-25 mm, then two-parted, 6-14 mm long lobes. *Pedicel* 27-56 mm long. *Flower* cernuous. *Ovary* elliptic-oblong, up to 4-6 mm long, 2-2.5 mm wide. *Perigone* pink, 46-68 mm long, 24-32 mm in diameter. *Tepals* oblanceolate, joined below for 4-5 mm, then 4-6 cm long, the outer 10-14 mm broad, the inner slightly narrower. *Filaments* declinate-ascending, the upper episepal 5-8 mm long, lateral episepal 9-17 mm long, lower epipetal 15-25 mm long, lateral epipetal 18-28 mm long. *Anthers* falcaie, 3-7 mm long. *Style* declined 30-35 mm long. *Stigma* trifid, the divisions 4-6 mm long, strongly recurved.

Specimens: Argentina, province of Jujuy, San Lorenzo, río de San Lorenzo; leg. Lorentz et Hieronymus, Ende X-1873 (Herbarium of Otto Kuntze, presented by Mr. Andrew Carnegie, 1908, determined as *Zephyranthes mesochloa* f. *rosea* O.K., typus NY).

The type-specimen of this species is determined as "*Zephyranthes mesochloa* forma *rosea* O.K.". I do not know whether such a name is published or not. If so, the mentioned specimen probably is the type. In any case, there are no impediments to use the same specimen as the type of a new species.

The epithet *roseus* cannot be used in *Habranthus,* due to the previous existence of *H. roseus* Sw. It is therefore a pleasure to name this species in honor of the distinguished botanist and friend, Dr. P.W.J. Maas, of Utrecht, Holland.

HABRANTHUS STEYERMARKII RAV., SP. NOV.

Species a *Habrantho spectabili* proxima sed floribus haud lilacinis sed albis et minoribus; a *H. niveo* floribus multo minoribus foliis haud glaucis, a *H. salinari* et *andalgalensi* folia tepalaque valde latiora recedit.

Planta ad 14-20 cm alta. Folia ad anthesin nulla. Scapus usque 9-12 mm longus. Spatha uniflora. Pedicellus spathae exsertus. Flos

albus ad 42-50 mm longus (in sicco). Tepala usque 2.5 mm connata, exteriora ad 40-50 mm longa circ. 8-9 mm lata, interiora ut videtur subaequalia. Filamenta fasciculato-declinata ad apicem valde incurvata, sepalinum superius 5-7 mm longum sepalina lateralia 7.5-8 mm longa petalina lateralia 17-20 mm longa petalinum inferius 20-22 mm longum. Stylus usque 22-26 mm longus. Stigma trifidus lobis 4.5 mm longis oblique patentibus ad apicem recurvatis.

Plant up to 14-20 cm high. *Bulb* ovoid, up to 30-45 mm long, 21-31 mm wide, prolonged into a 45-70 mm long pseudo-neck; outer coats brown, corrugate. *Leaves* none at anthesis. Scape 9-12 cm long. *Spathe* membranous, tubular for 19-24 mm, then bifid for 12-13 mm. *Umbel* one-flowered. *Pedicel* to 22-42 mm long. Ovary elliptical-oblong, up to 5-6 mm long, 1.3-1.4 mm wide (when dry). *Tepals* oblanceolate joined at the base for 2.5 mm; the outer 40-50 mm long, 8-9 mm broad, the inner seemingly as long as the outer. *Filaments* fascicled-declined rather incurved above; upper episepal 5-7 mm long, lateral episepal 7.5-8 mm long, lateral epipetal 17-20 mm long, lower epipetal 20-22 mm long. *Anthers* markedly falcate after pollen shedding, up to 4.5-5 mm long. *Style* declined, up to 22-26 mm long. *Stigma* trifid, its divisions at first obliquely spreading, then recurved, to 4.5 mm long.

Habitat.—The natural enviroment of this species is the dry wood of the Chaco formation, in the north-eastern part of the province of Jujuy, Argentina. Several years ago I gathered bulbs between Fraile Pintado and Ledesma, in the same region. The plants were growing near *Amaryllis parodii,* in a rather sandy soil.

The species is properly dedicated to Dr. Julian Steyermarkii, of the Instituto Botánico Caracas, Venezuela, for his outstanding contributions to the Botany of this Continent.

Specimens: Argentina, dept. San Pedro, San Pedro; leg. Cabrera & Kiesling 20277, 10-XII-1969 (LP). Idem, dept. Santa Bárbara, El Fuerte, 1380 m; leg. Cabrera 16287, 24-X-1964 (LP). Idem, Est. Calilegua, San Lorenzo; leg. Joergensen-Hansen, XI-1911 (typus SI 3570, isotypus BAB 35870).

This interesting species has its closest relative in *H. spectabilis Ravenna* (1969). However, it is distinguished by the almost pure white, smaller flowers.

HABRANTHUS NULLIPES RAV., SP. NOV.

Planta supra solum circ. 5-6 cm alta. Bulbus ovatus ad 35-37 mm longus circ. 24 mm latus in collo circ. 35 mm longo productus; tunicae exteriores ochraceae. Scapus perbrevis usque 20 mm longus leviter compressus ochraceus ad 2.9 mm latus. Spatha circ. 24 mm longa pallide ochraceo-viridescens inferne usque 4-5 mm tubulosa ad apicem circ. 8 mm bifida. Inflorescentia uniflora. Pedicellus nullus. Ovarium obovatum ochraceo-viridescente ad 4.9 mm longum circ. 3 mm latum. Perigonium sub sole bene expansum late infundibulatum circ. 50 mm latum. Tepala oblanceolata inferne usque 7 mm inter se connata, exteriora 35 mm longa circ. 8.9 mm lata albicantia striis roseo-ochraceis notata

extus basin versus viridescentia ad apicem tuberculato-apiculata; apiculus extus viridis; tepala intediora ad 34 mm longa circ. 10-10.5 mm lata obtusiuscula vel subacuta. Filamenta fasciculato-declinata alba, sepalinum superiorius 14 mm longum, petalina lateralia 15 et 19 mm longa, sepalina lateralia 14 et 16 mm longa, petalinum inferius 17-18 mm longum. Antherae semilunato-reniformes luteae ad 2.6-2.9 mm longae. Stylus declinatus albus ad 28-29 mm longus. Stigma trifidus albus lobis recurvato-patentibus vel erecto-patentibus 1.8-2 mm longis.

Plant up to 5-6 cm high. Bulb ovoid 35-37 mm long, 24 mm wide, prolonged for 35 mm into a pseudo-neck; the outer coats brownish. *Scape* very short, up to 20 mm, slightly compressed, brownish, 2.9 mm broad. *Spathe* up to 24 mm long, a pale greenish-brown, tubular below for 4.5 mm, bifid for 8 mm. Inflorescence one-flowered. *Pedicel* absent. *Ovary* obovoid greenish-brown, 4.9 mm long, 3 mm wide. *Perigone* expanding well only in the sun, widely funnel-shaped, 50 mm in diameter. *Tepals* oblanceolate, joined for 7 mm below; the outer 35 mm long, 8.9 mm broad, whitish with purplish-brownish streaks, greenish on the outer face below; a distinct apicule, dorsally green, with a distinct tubercle below. Inner tepals 34 mm long, 10-10.5 mm broad, rather obtuse or subacute. *Filaments* fascicled, declined, white; the upper episepal 14 mm long, lateral episepal 14-16 mm long, lateral epipetal each respectively 15 and 19 mm long, lower epipetal 17-18 mm long. *Anthers* lunulate-reniform, yellow, 2.6-2.9 mm long. *Style* declined, white, 28-29 mm long. *Stigma* trifid, white, its branches spreading recurvely or upright, 1.8-2 mm long.

Habitat.—Bolivian plateau, near Uyuni, dept. of Potosí, Bolivia. The species is found in the steppe, at nearly 3500 m, growing near *Cardenanthus* aff. *orurensis* Fost. (Irid.), *Stenommesson* sp.(?), *Descurainia* sp. (Cruciferae), *Chuquiraga* sp., and other rosulata Compositae.

Specimens: Culta in Santiago ex bulbo in stepposis pr. Uyuni Boliviae collecto; leg. Ravenna 2211, 23-XII-1976 (typus in Herb. Ravennae). (Diagnostic figure in 1979 PLANT LIFE.)

This unusual *Habranthus* is distinguished by having a very short, almost obsolete scape, with a single sessile flower. The latter feature is unique in the genus. The species reminscent somewhat of *H. erectus*, which has a short pedicel.

HABRANTHUS LEPTANDRUS RAV., SP. NOV.

Species a *Harbrantho saltensi* proxima sed perigonio praecipue carmineo antheris omnibus linearibus recedit.

Planta ad anthesin absque foliis usque 7 cm alta. Spatha membranacea sordide albo-rosea usque 10 mm tubulosa deinde circ. 11-11.5 mm bifida. Inflorescentia uniflofora. Pedicellus 17.5-19 mm longus, Flos leviter inclinatus. Ovarium clavatum vel oblongum ad 4.5 mm longum circ. 1.9 mm latum. Perigonium usque 25 mm longum circ. 30 mm latum. Tepala oblanceolata inferne circ. 2-2.3 mm connata usque 18 mm imbricato-contigua tubum simulantia deinde sub sole patentia ad basin veram lutescentia ad partem contiguam pallide roseo-

viridescentia sursum intense carminea intus in medio inferiori albicantia, exteriora ad 30-31 mm longa circ. 7 mm lata tuberculato-apiculata; (apiculus circ. 1.2 mm longus), interiora ad 32.5-33 mm longa circ. 3.7-3.8 mm lata subacuta. Filamenta stricte fasciculata tenuiter filiformia alba, sepalinum superius 5.5 mm longum, sepalina lateralia 7 mm longa, petalina lateralia 12.5 mm longa, petalinum inferius 14 mm longum. Antherae lineares interdum leviter tortiles luteae in perigonio haud versatiles ad 5.8-6.7 mm longae. Stylus rectus haud declinatus albus ad 18 mm longus. Stigma trifidus lobis albis recurve patentibus ad 3-3.5 mm longis.

Plant up to 7 cm high. Bulb ovoid, 33 mm long, 25 mm wide, prolonged for 20-25 mm into a pseudo-neck, the coats blackish. *Leaves* none at anthesis, serotine; after anthesis linear, grey-green, slightly pruinose, spreading upwards, up to 8-15 cm long, 3-4 mm broad. *Scape* weak, subcylindrical, brownish-green, up to 13 mm long, 1.7 mm broad. *Spathe* membranous, dirtily whitish-pink, tubulfor 10 mm below, then bifid for 11 mm above. *Umbel* one-flowered. *Pedicel* dertily greenish, up to 17.5-19 mm long. *Flower* slightly inclined. *Ovary* club-shaped or almost cylindrical, 4.5 mm long, 1.9 mm wide. *Perigone* 25 mm long, when fully expanded, 30 mm in diameter. *Tepals* oblanceolate joined at the base for 2-2.5 mm, imbricatelly contiguous and simulating a tube for 18 mm, then spreading, yellowish at the very base, palely greenish-pink on the contiguous portion, intensely carmine upwards, whitish in the lower half inside; the outer 30-31 mm long, 7 mm broad apiculate-tubercled (the apicule 1.2 mm long); the inner 32.5-33 mm long, 3.7-3.8 mm broad, subacute. *Filaments* filiform, weak, white, closely fascicled; the upper episepal 5.5 mm long, lateral episepal 7 mm long, lateral epipetal 12.5 mm long, lower epipetal 14 mm long. *Anthers* linear sometimes slightly twisted, up to 5.8-6.7 mm long, yellow, not versatile at least when surrounded by the tepals. *Style* straight, not declined, white, up to 18 mm long. *Stigma* trifid the divisions white spreading recurvely, 3-3.5 mm long.

Habitat.—Meadows at the Chaguarani gulch, in the prov. of Mizque, dept. Cochabamba, Bolivia. It grows in sandy soil near *Junellia* sp. (Verbenaceae), *Oxalis* sp., *Portulaca* sp., and several grasses.

Specimens: Culta in Santiago ex bulbis in herbosis amoenis ad Chaguarani prov. Mizque civit. Cochabamba, Boliviae collectis; leg. Ravenna 2212, XII-1976 (typus in Herb. Ravennae).

This interesting species approaches in some manner to *H. saltensis* (see Fig. 15 in vol. 30 of this Journal). In the latter, the anthers of the episepal stamens are almost linear, quite distinct from those of the epipetal series, which are semilunate. The reason for this dimorphism, as assumed before (Ravenna 1970 & 1971b), may be the circumstance of being concealed by the contiguius portion of tepals.

In *Habranthus leptandrus,* both series of stamens are hidden in the narrow tube formed by the lower half of tepals. Suggestively enough, all the stamens bear here linear, non-versatile anthers.

The expanded part of the flower is of a deep, homogeneous carmine

color, rather unusual in the South American representatives of the genus. The species may be a pretty object for horticulture.

HABRANTHUS MICROCARPUS (RUSBY) RAV., COMB. NOV.

Atomosco microcarpa Rusby, Nem. New York Bot. Gard. 7:213, 1927,

I recently detected the holotype of this entity in the general herbarium of the New York Botanical Garden. It represents an *Habranthus* species, not a *Zephyranthes* (syn. Atamosco Adans.).

Specimens: Bolivia, dept. Beni, pampas near lake Rogagua, 1000 m; leg. M. Cárdenas 1396, (1-XI-1921 type NY).

2. **HABRANTHUS CARMINEUS** RECORDED IN THE FLORA OF URUGUAY

Years ago (see Ravenna 1970, p. 5), I described *Habranthus carmineus* from living plants flowered at Buenos Aires from bulbs gathered by me near Concepción del Uruguay, Argentina. The flower is whitish or pinkish with carmine tones. The stigma divisions are the longest in the genus. The latter feature leads to easy identification of the species.

A specimen from Uruguay in the herbarium of the Instituto Darwinion, Argentina, belongs to this species. The geographical area is therefore extended to the east into the Uruguay Republic.

Specimens: Uruguay, dept. Colonia Suiza, Colonia Suiza, leg. I. De la Rua, 1-1910 (SI 34).

VIII. STUDIES IN THE GENUS *AMARYLLIS*

Two new species from Brazil, and a new form of *A. argentina* are described.

1. **AMARYLLIS CURITIBANA** RAV., SP. NOV.

Planta usque 44-48 cm alta. Folia basalia ad anthesin incipientia lineari-ensiformia marginibus tenuis. Spatha circ. 45-57 mm longa valvis subaequalibus lanceolatis. Inflorescentia biflora. Flores ascendentes praeter basin viridem rubri. Tepala oblanceolata inferne circ. 10-11 mm connata, exteriora ad 9 mm longa circ. 30-32 mm lata lateralia contigua, interiori-lateralia ad 73-78 mm longa circ. 14 mm lata, interiori-inferius acutum ad 70 mm longum circ. 10 mm latum. Filamenta arquate ascendentia ad apicem haud incurva quadriseriata circ. 57-70 mm longa. Antherae oblongo-reniformes. Stylus horizontalis ad 80-86 mm longus. Stigma trifidus.

Plant up to 44-48 cm high. *Bulb* widely ovoid or subglobose to 35-40 mm long, 32-38 mm wide prolonged into a 20-30 mm long pseudoneck. *Leaves* at anthesis not fully developed, up to 11-15 cm long, 11-13 mm broad, subacute. *Scape* single or two, about 93-34 cm long, 13-15 mm broad near the base. *Spathe-valves* lanceolate, free to the base, up to 45-57 mm long. *Umbel* 2-flowered. *Pedicels* up to 35-37 mm long. *Flowers* obliquely ascending, red, with a green base which dilutes upwards almost to the apex of the tepals. *Tepals* lanceolate concrescent below for 10-11 mm; the outer 9 cm long, 30-32 mm broad, the lateral

pair contiguous with slightly connivent apices, the apicule 1.7-2 mm long; inner tepals up to 73-78 mm long, 14 mm broad, except the lower which is 70 mm long, 10 mm broad, more acute, and subtended by the lateral, contiguous outer tepals. *Filaments* archedly ascending, not at all incurved at the apex; the lateral episepal 57-58 mm long, the upper episepal 60 mm long, lower epipetal 62-63 mm long, lateral epipetal 67-70 mm long. *Anthers* reniform-oblong, up to 3.9-4.5 mm long. *Style* lying on the lower inner-tepal up to 80-86 mm long. *Stigma* trifid, the divisions 3.5-4.5 mm long, recurved.

Specimens: Brazil, Paraná, mun. Curitiba, BR-116, Río Iguazú; leg. Kummrow 642-8 (Typus Herb. Rav., isotypus Herb. Hatschbach).

This is another species in the Series *Avifloreae*, subgenus *Omphalissa*. Its closest relative appear to be *A. iguazuana* Rav., differing in the more uniform red color, less undulate tepals, and longer stigma divisions.

2. **AMARYLLIS LEUCOBASIS** RAV., SP. NOV. (SUBGENUS **OMPHALISSA**)

Planta saltem 40 cm alta. Folia basalia ad anthesin incipientia lineari-lorata textura firm circ. 11-14 mm lata marginibus callosis, Scapus circ. 28 cm langus usque 10 mm latus. Valvae spathis 40-45 mm longae. Inflorescentia biflora. Flores cernui. Perigonium infundibulatum ruber ad basin albus (fide coll.). Stamina arquato-adscendentia prominentia. Antherae 5-6 mm longae. Stylus declinato-arquatus ad 9-12.4 cm longus. Stigma subcapitatus obscure trilobatus.

Plant up to 40 cm high or perhaps more. *Bulb* globose 5-5.5 cm in diam., prolonged into a 30-35 mm long pseudo-neck. *Leaves* linear-lorate at anthesis not fully developed, firm textured, with distinct callose edges, about 75-95 mm long, 11-14 mm broad, subacute. *Scape* up to 28 mm long, 10 mm broad. *Spathe-valves* 40-45 mm long. Inflorescence 2-flowered. *Pedicels* 39-43 mm long. *Flowers* cernuous. *Ovary* obovoid or subellipsoid 8-9 mm long, 4-4.5 mm broad. *Perigone* infundibulate up to 8.5-11.5 cm long, 8-9 cm in diam. *Stamens* prominent; its filaments archedly ascending, not at all incurved at the apex, the upper episepal 6.5-9 cm long, lateral episepal 7-9.6 cm long, lower epipetal 7.5-10 cm long, lateral epipetal 7.7-10.6 cm long. *Anthers* 5-6 mm long (after dehiscence). *Style* archedly declined, up to 9-12.4 cm long. *Stigma* subcapitate, obscurely trilobed.

Specimens: Brazil, Goiás, mun. Mineros, BR-364, prox. Córrego Alegre; leg. Hatschbach 35016 & R. Kummrow. (typus in Herb. Ravennae, isotypus Herb. Hatschbach).

The leaves of this interesting species are narrow, with callose edges like those in *A. solandraeflora*. However, the flower is totally different. With arched, prominent, not at all incurved filaments, it clearly belongs in subgenus *Omphalissa*. According to the collector, the perigone is red with a white base, an unusual arrangement of colors! Hence the specific epithet.

3. **AMARYLIS ARGENTINA** (PAX) RAV. FORMA **ROSEA** (RAV., F. NOV.

A forma typica floribus roseis recedit. It differs from the typical form in its pink flowers.

Habitat.—An element of the Chaco-like vegetation in the north-eastern part of the province of Tucumán, in Argentina.

Specimens: Cerro del Campo in ditione Burruyacu provinciae Tucumán Argentinae; leg. Ravenna 115, XII-1961 (typus in Herb. Ravennae).

A single clump of this form was found by me several years ago in the above mentioned place. There is another specimen of the same, in the Argentine Museum of Natural History, collected by S. Venturi also in the department of Burruyacu.

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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 Crinadonna,** 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 prepaid 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 AMARYLLIS CLONES, 1977

Registered by John Wade Deme, Rt. 5, Box 236, Kinston, N. C. 28501

Amaryllis clone **'Delbert Howard'** (Deme, 1977); **A-1016;** U-4-6 fld; 20" h; flower double, 6" across face, 16 petals. Petals have a wide dark salmon border on each petal, the center of each petal is white, hose on hose petal arrangement. Vigorous. Blooming dates not now established, but does bloom during winter months.

Amaryllis clone **'Double Salmon'** (Deme, 1977); **A-1017;** U-4 fld; 20" h; flower double, 6½" across face, 17 petals. Petals all salmon except for a small white streak in lower center of each petal. Hose on hose petal arrangement. Vigorous. Blooms any month of year and has produced 6 scapes in a one-year period.

Amaryllis clone **'Judy'** (Deme, 1977); **A-1018;** U-4 fld; 24" h; flower double, 6" across face, 18 petals. Petals dark orange-red with center of throat white. Hose on hose petal arrangement. Vigorous. Has produced 5 scapes in a one-year period.

Amaryllis clone **'Judy Weston'** (Deme, 1977); **A-1019;** U-4-6 fld; 20" h; flowers double, 6" across face, 21 petals. Petals are light pink with white veins. Lower center of each petal is white. Hose on hose petal arrangement. Vigorous winter bloomer, but specific dates not as yet established.

Amaryllis clone **'Kristy'** (Deme, 1977); **A-1020;** U-4-6 fld; 16" h; flower double, 6" across face, 16 petals. Petals a mixture of dark red and white, hose on hose petal arrangement. Vigorous, blooming any month of year and as many as four scapes per year.

Amaryllis clone **'Louis Parajos'** (Deme, 1977); **A-1021;** U-4-5 fld; 16" h; flower double, 6" across face, 19 petals. Petals have dark orange-red border and center part of each petal is white. Hose on hose petal ar-

rangement. Vigorous winter bloomer.

Amaryllis clone **'Lynn'** (Deme, 1977); **A-1022;** U-4-6 fld; 24" h; flower double, 6" across face, 16 petals. Petals orange-red, center of each petal white. Hose on hose petal arrangement. Vigorous, producing as many as six scapes during any months of a single year.

Amaryllis clone **'Matilda Parajos'** (Deme, 1977); **A-1023;** U-4-5 fld; 16" h; flower double, 6" across face, 15 petals. Petals are picotee with pink and some pink flushes on the upper petals; hose on hose petal arrangement. Vigorous winter bloomer producing two scapes per year.

Registered by Harry Deleeuw Co. (Pty) Ltd., P. O. Box 7, Maraisburg 1700 Tvl. South Africa.

Amaryllis clone **'Basuto'** (Deleeuw, 1977); **A-1024;** U-4 fld; 47 cm h; flower 18 cm across face, dark currant red in color, two scapes from September to December. Deciduous hybrid with 1966 introduction/distribution date.

Amaryllis clone **'Blushing Bride'** (Deleeuw, 1977); **A-1025;** U-4 fld; 39 cm h; light rose flowers are 18 cm across face and carried on two scapes blooming September to December. Deciduous hybrid dating from 1970.

Amaryllis clone **'Bold Leader'** (Deleeuw, 1977); **A-1026;** U-4 fld; 40 cm h; flower pure red, 17 cm across face, carried on two stems blooming September to December; a deciduous hybrid dating from 1969.

Amaryllis clone **'Carnival'** (Deleeuw, 1977; **A-1027;** U-4 fld; 45 cm h; flowers are white striped scarlet, 18 cm across face, on two scapes blooming September to December. Deciduous hybrid dating from 1966.

Amaryllis clone **'Cocktail'** (Deleeuw, 1977); **A-1028;** U-4 fld; 54 cm h; two scapes with white-centered red flowers blooming September to December. Deciduous hybrid dating from 1971.

Amaryllis clone **'Desert Dawn'** (Deleeuw, 1977); **A-1029;** U-4 fld; 57 cm h; Salmon orange flowers carried on two September to December blooming scapes are 16 cm across face. Deciduous hybrid dating from 1969.

Amaryllis clone **'Honeymoon'** (Deleeuw, 1977); **A-1030;** U-3-4 fld; 43 cm h; wine red flowers borne on 2 stems are 18 cm across face and bloom September to December. Deciduous hybrid dating from 1970.

Amaryllis clone **'Intokazi'** (Deleeuw, 1977); **A-1031;** U-4 fld; 60 cm h; pure white flowers 16 cm across face on two stems blooming September to December. Deciduous hybrid introduced in 1969.

Amaryllis clone **'Midnight'** (Deleeuw, 1977); **A-1032;** U-4 fld; 46 cm h; mahogany flowers bloom September through December, are 19 cm across face and borne on two scapes. Deciduous hybrid introduced in 1975.

Amaryllis clone **'Milady'** (Deleeuw, 1977); **A-1033;** U-4 fld; 46 cm h; magenta to magenta-rose flowers are 17 cm across face, produced on two scapes blooming September through December. Deciduous hybrid dating from 1970.

Amaryllis clone **'Shaka'** (Deleeuw, 1977); **A-1034;** U-4 fld; 48 cm h; very dark red (mahogany) flowers measure 18 cm across face. Deciduous September to December bloomer has two scapes and was introduced in 1972.

Amaryllis clone **'Springtime'** (Deleeuw, 1977); **A-1035;** U-4 fld; 43 cm h; light rose flowers are 20 cm across face and borne on two scapes. 1972 introduction date for this hybrid.

Amaryllis clone **'Summertime'** (Deleeuw, 1977); **A-1036;** U-4 fld; 38 cm h; two stems of dark neyron rose flowers, each 17 cm across face. Deciduous hybrid dating from 1968.

Amaryllis clone **'Wedding Dance'** (Deleeuw, 1977); **A-1037;** U-4 fld; 43 cm h; white flowers carried on two scapes are each 19 cm across face. 1970 introduction date for this deciduous hybrid.

AMARYLLID NOTES

HAMILTON P. TRAUB

Alstroemeria x *davisiae* Duncan ex Traub, *hybr. nov.*—Duncan, in *Plant life 33:* 71-72, fig. 18. 1977, *anglise.* Planta hybrida A. pulchellam ♀ et A. pelegrinam ♂ intermedia. Specimens: cult. Sumner, Wash., May 6, 1977. TRA Nos. 1157 (type); 1158 & 1159 (isotypes).

PLANT LIFE LIBRARY—continued from page 68.

SMITHSONIAN CONTRIBUTIONS TO BOTANY. In this numbered serial publication, Smithsonian publishes original monographs dealing with various plant groups. These may be obtained from Smithsonian Institution Press, Washington, D. C. 20402.

No. 32. A MONOGRAPH OF THE LICHEN GENUS BULBOTHRIX HALE (PARMELIACEAE), by Mason E. Hale, Jr., Pp. 29. 7 figures. 1976. Includes a world-level revision, including 29 species of **Bulbothrix,** a primarily tropical genus with the main center of speciation in Brasil.

No. 36. FLORA OF MICRONESIA, 3: CONVOLVULACEAE, by F. Raymond Fosberg and Marie-Hekene Sachet. Pp. 34, 1 figure. 1977. The third part of the Flora of Micronesia, includes a floristic account of the **Convolvulaceae** of Micronesia, with descriptions, keys, synonomy, ethnobotany and citations of geographical records and herbarium specimens.

No. 37. POLLEN MORPHOLOGY AND THE RELATIONSHIP OF PLUMBAGOACEAE, POLYGONACEAE AND PRIMULACEAE TO THE ORDER CENTROSPERMAE, by Joan W. Nowicki and John J. Skvarla. Pp. 64, 200 figures, 5 tables. 1977. The evidence argues against a close relationship of these three families with the **Centrospermae,** and the absence of any pollen types common to these three families further suggests that they are not closely related to each other.

FOLIOSE AND FRUTICOSE LICHENS FROM TRISTAN DA CUNHA, by M. Jorgensen. Det Norska Videnskaps-Akademi. I. Mat.-Naturv. Klasse Skrifter Ny Serie No. 36. University Press. Oslo. 1977. Eighty-four foliose and fruticose lichen species are described; 69 of these species are new to the islands. Four new species are described.

MORPHOLOGY OF VASCULAR PLANTS: LOWER GROUPS (PSILOPHYTALES TO FILICALES), by Arthur J. Eames. 1936. Robert E. Krieger Publ. Co., 645 New York Av., Huntington, New York 11743. Reprint 1977. Pp. i-xviii + 433. Illus.—This reprint of Eames' 1936 text on the morphology of the lower groups, **Psilophytales** to **Filicales,** of vascular plants will be welcomed by the present generation of workers in this field.

CACTUS IDENTIFIER, INCLUDING SUCCULENT PLANTS, by Helmut Bechtel. Sterling Publ. Co., 419 Park Av. South, New York City 10016. 1977. Pp. 256. Illus. Trade Edition $4.95. Profusely illustrated in color, this attractive book is concerned with the care of succulent plants, their propagation, disease control and their scientific names. The species included are from the following families, Cactaceae, Euphorbiaceae, Crassulaceae, Compositae, Apocynaceae, Geraniaceae, Asclepidaceae, Aizoaceae and Liliaceae. Scientific name, Popular name, and general indices complete the volume.

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3. GENETICS AND BREEDING

AMARYLLIS BREEDING POTENTIALS - 1977

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The diversity of germ plasm now available in *Amaryllis* forces difficult decisions in a modern breeding program. Nevertheless, certain guidelines can be established. Vigor, aesthetic proportions and ease of culture rank high on any list of factors to be considered when using the new germ plasm. If special care is required for the culture of rare, wild forms, one is almost invariably rewarded with primary hybrids of easier culture. It is then far from a game of chance that desired traits can be incorporated into a hybrid population from which new forms can be selected.

Individual considerations are important in selecting hybrids on the basis of aesthetic merit. It seems to me unfortunate that a stereotype has been established favoring the large *leopoldii*-type hybrids to the near exclusion of other forms. This has sometimes influenced breeders to neglect new germ plasm from which these other forms can be developed. The diploid species mentioned below offer the potential for the development of new forms. I admit to personal prejudice when I state my preference for the graceful and charming miniatures which result from hybridization of the diploid species. I have been astonished to learn that relatively few amaryllis fanciers have even seen the miniature species and their hybrids.

GENE SYMBOLS

Sufficient evidence is now at hand to propose two gene symbols for amaryllis. Another can be suggested although evidence is not yet available to prove for certain that the trait, total lack of anthocyanins, exists as a Mendelian gene in the available species.

In diploid species and their hybrids, cyanidins (pink to deep rose) appear to be dominant in all cases tested over pelargonidin (salmon to scarlet). Therefore, the symbol *c* is tentatively used for the gene at this locus.

The midrib leaf stripe of *A. reticulata* var. *striatifolia* is also inherited as a simple dominant. The symbol *s* has been tentatively designated here. Plants of genotype $+/s$ or $+/+$ transmit the trait to progeny in diploid crosses in a Mendelian ratio. Most amaryllis are of genotype *s/s*, if diploid, and do not have the capacity to produce the stripe.

Hopefully, another gene involving floral pigmentation, tentatively designated *p* may exist in some natural populations. Plants of genotype *p/p* would lack the capacity to produce pelargonidin. And, since pelargonidin has been shown to be the precursor to cyanidin in other

plants studied, those of genotype *p/p* should appear as pure white, yellow or green. A likely candidate for a species of genotype *p/p* is *A. parodii.* Test crosses have been made among several of Doran's primary hybrid of *A. parodii* in an attempt to establish hybrid plants with this useful genetic trait.

It seems highly unlikely that any species has the capacity to produce the pigment delphinidin, so truly blue amaryllis must be all but ruled out. However, a third anthocyanin may be present in addition to the two previously reported (1). This might be another cyanidin from the visual color. *Amaryllis striata* var. *aracensis* has a purple throat marking in addition to the basic salmon floral color. Pigment distribution in *A. cybister* and its hybrids also suggests some independence of floral color inheritance. The cross, *A. cybister* x *A. striata aracensis,* has been made with the hope that enough pigment will be present in this hybrid that it can be isolated and characterized.

Tetraploids display a lack of complete dominance at the *c* locus. This seems to explain the additional colors found in the tetraploids such as deep blood red. A plant of genotype *+/c/c/c* may have a mixture of pelargonidin and cyanidin as the floral pigments. Selection for whites among tetraploids also has presented some problems. Often, such whites are plants with a minimum rather than an absence of pigments. Crosses among minimally pigmented plants can then yield some pigmented progeny just through recombination. It seems evident that genetic stocks totally lacking the capacity for anthocyanin synthesis would expedite breeding forms such as a tetraploid yellow.

AMARYLLIS BELLADONNA

Amaryllis belladonna is a common and very desirable garden plant in South Florida and the West Indies. It appears to be far better adapted to tropical and subtropical conditions than the tetraploid hybrids, most of which have been selected under cooler greenhouse conditions. It has a grace and simplicity of line which makes it valuable for landscape planting in these areas. But, the breeding potential of this variant of the species is somewhat limited. Few seeds are produced when pollinated with other diploids, although fertile hybrids result when it is used as a pollen parent, particularly on *A. evansiae* and its hybrids (2).

Annoyed at being unable to set a reasonable amount of seed on the local garden variety in South Florida, I began a search for what might be the other mating type of this species. Pollen was collected from various sources in Dade County, Florida, but no seeds were set. Furthermore, pollen of several South American clones of *A. belladonna* also failed to set on the local plants. My request to friends on Grand Cayman Island for seeds was answered negatively, but they provided flowering size bulbs of a robust clone similar in color and habit to those grown in South Florida. This also had low fertility, setting a few seeds with the pollen of *A. reticulata.* Failures were noted in both directions in attempts to produce seeds by pollinating among plants from the two

sources.

A noteworthy point concerning the South Florida and Grand Cayman *A. belladonna* is the prolific formation of offsets. They can thus be propagated easily without seeds. From what I have learned, other West Indies plants of this species are similar in habit. However, the more fertile clones of the species, from, for example, Brasil, produce relatively few offsets.

One possible explanation for the low fertility in some plants of this species may be that they could have arrived in the West Indies on a floating island or during a violent tropical storm. Other plants in the West Indies and a few on the southern tip of Florida show a close affinity with the flora of South America.

It would seem that the *A. belladonna* which reached the West Indies may well have been separated from their natural pollinating vector. Under such conditions, reproduction by offsets would confer an adaptive advantage. Other species of amaryllis might have arrived in the West Indies without this advantage and were consequently lost.

The last leg of the trip to continental North America probably came about because of the attractiveness of *A. belladonna* as a garden plant. A good guess would be that Spanish colonials transported the species to Florida, at least as far north as St. Augustine. Again, this form flourished because it was easily propagated from offsets. So, perhaps most of the plants now grown in gardens in Florida and other parts of the South came from just a few entries by the early colonials.

Plants propagated vegetatively for long periods of time tend to accumulate recessive mutations. A few are considered desirable such as the mutant forms of the rose 'Peace.' But most are deleterious and lower fertility. This may well have happened with the garden *A. belladonna.*

One plan is to establish a line of this species with the traits of the garden form but easily propagated from seeds. More fertile South American clones will be pollinated with this most desirable form.

It is remarkable that a plant which seems to be propagated exclusively by vegetative means displays so few virus symptoms. Less than 10% of those I observed in gardens had any symptoms of virus infection. Thus, we may find here a source of germ plasm for at least slower transmission of virus than in the cultivated tetraploids.

AMARYLLIS CALYPTRATA

Amaryllis calyptrata has very interesting possibilities but seems to form hybrids only rarely. However, preliminary evidence suggests that this species seems to be avoided by the lubber grasshopper of South Florida. Such grasshoppers often eat the tetraploid hybrids and other species all the way to the bulb plate.

Fortunately, the timely flowering of this species by Caryn Ecker allowed ample testing of its pollen on *A. evansiae, A. cybister* and several other species hybrids. All were without success on my part. She, how-

ever, was successful in setting seed on the *A. calyptrata* plant with pollen of the hybrid *A. aulica stenopetala* x *A. fosteri.* The elegant seedlings of this cross are not only vigorous but some inherited the red foliar pigmentation of the pollen parent. Caryn's hybrid may well be the needed gene bridge to allow the genetic potential of this species to be incorporated into the new diploid hybrids. The quarter *A. fosteri* parentage of this hybrid may provide sufficient chromosome matching that further hybrids can be produced with the many species with which *A. fosteri* crosses so freely.

John Cage informed me of his success with Miss Ecker's pollen on *A. aulica stenopetala.* Again, vigorous seedlings resulted. With the many failures observed in attempting to produce hybrids of *A. calyptrata,* this suggests a close genetic affinity between *A. aulica stenopetala* and this species. The bad news here is that I placed the Cage hybrid outdoors only to find that the seedlings were attacked by the grasshoppers, although none were completely lost. So, if the species has a lack of appeal for these grasshopper beasts, it may be recessive in nature.

It would be most interesting to determine whether or not the unique fragrance of *A. calyptrata* is related in structure to the very pleasing fragrance of *A. brasiliana* and several other species. Even though considered objectionable by some, the intensity of fragrance in this species might be the path toward breeding amaryllis as fragrant as the almost overpowering *Hymenocallis palmeri.*

LITERATURE CITED

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2. Bell, W. D. 1975. The Korsakoff amaryllis hybrids. Plant Life 31: 32-33.

THE ROLE OF **AMARYLLIS** SPECIES IN FUTURE COMMERCIAL HYBRIDS

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The English, Germans and Dutch used a small fraction of the total number of *Amaryllis* species at the start of their very long breeding programs. The various large-flowered strains that evolved from those programs are now really quite similar, in my opinion, even though the color range is fairly wide. The traits of the wild ancestors are now difficult to identify in the hybrids.

The present-day possibility of introducing some of the desirable traits of the various species into the large hybrids is a perennial dream of breeders. For instance, we would like to add: (1.) The yellowish color of *A. evansiae, A. parodii,* and *A. aglaiae;* (2.) The vigor of *A. papilio, A. calypstrata,* and *A. aulica,* var. *stenopetala;* (3.) The fall-blooming habit of some of the above; (4.) The dotted segs of *A. pardina* and *A. lapacensis;* (5.) The color of *A. doraniae,* and (6.) The water

tolerance of *A. angustifolia.*

It is important to observe that not one of these dreams has succeeded, mainly because of differences in chromosome counts and other genetic incompatabilities. Many viable crosses have been made, but the desired trait of the species has been either partially or fully suppressed or diluted in the progeny. My clone "Great Pumpkin" is ¼ *A. aulica* (a vigorous variant) but it neither is fall-blooming nor does it resemble *A. aulica* in other ways. Perhaps the greatest success has occurred in the various hybrids of *A. evansiae* and "Dutch" clones—several generations of breeding have produced pretty seedlings in pastel shades. However the flowers are neither large, yellow, nor of good form. Until breeders produce compatable tetraploid forms of the most desirable species or species hybrids, this simple-minded approach looks very fruitless.

People who can raise extremely large numbers of seedlings should continue to hybridize species x Dutch-crosses, I think, to try to achieve the improbable breakthrough. Also, some really good technical work is being done to produce tetraploid forms of species, and these or their hybrids will be available sooner or later to the amateur breeder. In the meantime, I suggest a different emphasis in amateur breeding involving *Amaryllis* species: that is, the progressive development of species x species hybrids.

A cybister hybrids have much potential, for instance. The first generation, or primary hybrid, of *A. cybister* x *A. evansiae* is very easy to grow and flower, and the four pretty yellowish blooms have little pigmentation. The bulb is about 2″ in diameter. The segs are narrow and graceful but not as spidery as in *A. cybister.* Further generations should be selected either for the *cybister* form or for wide, regular segs. The deepest yellow colors should be selected, as well as the largest plants that grow and bloom easily. In ten years or less, one should have an excellent garden or pot plant, perhaps with much larger flowers than either original ancestor.

The whole aulica group could be interbred for large vigorous bulbs with large, brilliant flowers that bloom in the fall—but not if the breeder stops after one or two generations. I suggest that *A. papilio, A. calyptrata, A. aulica,* variety *stenopetala,* and any other species that cross easily with these be interbred while continually selecting for the desired traits. Larger flowers would almost surely evolve in the recombinants. This is obviously a ten-to-twenty year project, but it is better than miscellaneous crosses that are not bred further, and you might find that part of the work has already been done for you.

Selected hybrids of *A. angustifolia* endure much water while growing and much dehydration while dormant. In limited numbers, I am further breeding these for large yellow flowers of *Sprekelia* form while retaining the good growth habits. The other original parent was *A. evansiae* x *A. anglaiae.* Later, the best plant from this program could be crossed with the best of the *A. cybister* hybrids to obtain hybrid vigor in large-flowered yellow flowers of *Sprekelia* form. Only those that

bloom easily from dormant bulbs would have commercial value.

The enterprising hobbyist can think of other logical projects. As I see them, the following principles are appropriate: (1.) Start with a group of species having rather definite desirable traits. (2.) Intercross as many species as possible, but only those that are strongly interfertile, ones that produce many viable seeds. (3.) Limit the number of separate projects severely, so that many seedlings and many generations can be covered. (4.) Select to meet preset criteria. If one set of criteria is unproductive, write down another set, if possible.

What kind of new species hybrids would be successful commercially? Some modeled after the Dutch hybrids? No, unless the breeder can work for 150 years. I think salable new species hybrids will meet a practical need and be distinct and different, like tulips or daffodils. If *Sprekelias,* for instance, could really be grown, harvested, shipped, and then brought into *lasting* bloom by the novice, all with ease and dependability, then the market for them would be many times the present one.

Editorial Note.—Observations in support of Dr. Cage's thesis: Unattractive greenish-yellowish and yellowish segregates sometimes appear in large progenies of the Mead-strain large-flowering *Amaryllis* hybrids. These are destroyed by the breeder, but this is mistaken. Such yellowish segregates although unattractive when crossed with the yellowish-flowering *Amaryllis* species—*A. evansiae, A. parodii* and *A. aglaiae* could apparently give hybrids which when graded up by selective breeding could finally result in the real yellow large-flowering hybrid *Amaryllis.*

The large-flowering white *Amaryllis* hybrids with the *yellowish throat* should also be used in crossing with the yellowish-flowered *Amaryllis* species. In the two cases cited, it is the large-flowering habit combined with yellow possibilities in the large-flowering member of the cross that is so important in attempting to reach the final goal more quickly by the repeated and repeated intercrossing followed by backcrossing on the large-flowered member of the cross, and careful selection.—*Hamilton P. Traub*

A STEP TOWARD A HYBRID YELLOW **AMARYLLIS**

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HYBRIDIZATION HISTORY

On August 19, 1972, Mr. Leonard Doran brought to the meeting of the Southern California Hemerocallis and Amaryllis Society a potted *Amaryllis* species in flower. It was, according to my notes a clear yellow'', with a perigone 2 cm in diameter, with a tepaltube approximately 5 cm long. As I recall, its umbel was held upright on a scape approximately 45 cm long and had at least four flowers. Mr. Doran generously permitted me to take pollen home from one of the flowers. I refrigerated it and, on 22 August 1972, applied it to a Peru-

vian *A. belladonna* which was carefully de-anthered.

On 24 September 1972, 68 seeds were gathered. Germination inside the protection of my screenhouse, under Gro-Lux lamps, was very good, and 60 seedlings were transplanted to pots. At that time, all had long, strong roots and most had three leaves, 10-15 cm long. In the winter of 1973, 59 remaining were brought into the house in my den and continued to receive special care in a Floracart under closer Gro-Lux lamps. In April and May of 1974, all were moved out to benches in semi-shade and, when they were considered to have "hardened off", were set out in beds with gravel under and around the bulbs. All had firm bulbs, ovoid in shape, with large main roots and long, strong feeder roots.

Fig. 20. Creamy-pink hybrid **Amaryllis** produced by R. E. Tisch. See text for description.

In June of 1975 they began flowering. Since then 20 have flowered. Growth varies from vigorous to weak, some having dwindled and died. Offsets vary from plentiful to none. Coloration, size and persistence of foliage vary markedly (see Description). When I discussed the results with Mr. Doran, he voiced his opinion that I could not have seen a "bright, clear yellow" flower on his plant, and possibly was seeing what I had hoped one day to see. To the best of his memory, he had brought in a greenish-flowered plant which he recalled as possibly his "Number A-15", as yet unidentified or named. So be it.

DESCRIPTION

Definitely in the Elegans Group. Leaves 2-5 cm broad, 20-35 cm long, sometimes persistent to a point of being evergreen in Woodland Hills, California, sometimes disappearing during the winter, the former fully developed prior to flowering, the latter developing to full size only after flowering. Perigone 8-12 cm long, 5-7 cm in diameter when expanded. Tepaltube green, 2.5 cm long, obscure or absent paraperigone. Stigma capitate (obscurely trifid). Stamens shorter than perigone. Tepalsags yellow-green at base, background coloration from white to apricot, edges from cream through burnt orange to bright red. Scape 20.5 to 50 cm long, gracefully tapered, never weak. Pedicels cylindrical, 4.5 - 6 cm long. Umbel 2 - 5 flowered. Spathe-valves green, lanceolate. Setepalsegs and petalsegs not significantly different in size or coloration in the cream-toned and apricot-toned flowers, but setepalsegs are wider in the orange-toned and red-toned flowers (like the maternal parent) and in those the lower petalseg is noticeably narrower. Anthers small, oblong, from solid white or yellow to red-pencilled white. Bulb from ovoid to globose, 3 - 6.5 cm in diameter, neck short, tunics brown, short or no apparent rhizomes to offsets, thick fibrous roots.

CULTURE

Grows well in either pots, indoors or outdoors, or in outdoor beds. All have been grown only with gravel under and around the bulbs. They obviously prefer semi-shade to deep shade or full sun in the Woodland Hills, California climate. All have done well with their roots in rich, loose soil with a goodly proportion of humous. Feeding in done with weak fish-base liquid fertilizer solutions weekly. They respond to generous watering, provided the drainage is fast. After continued growth all winter in the screenhouse, they flower very early in the Spring, and many times again in the mid-to late-Summer. Two to three scapes per bulb are common. Their aspect is pleasing, but they definitely are in the more modest color ranges, none being strikingly brilliant. So far all have been self-sterile and sterile to any attempted inter-specific crosses attempted. I personally find this plant a welcome relief from the big, flat-faced, blatant commercial Amaryllis. In my garden and among my potted plants they are pleasing companions to my *A. striata*-commercial crosses (which I designate as my "Pelagrina" group, *A. vittata, A. belladonna* and *A. petiolata.*

BREEDING DOUBLE **AMARYLLIS**

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During high school, I was fascinated by all *Amaryllis* species and hybrids. Whether it was the bulb size or the huge flower stalk, the fascination continued when I went to work for Park Seed Company as grower in 1965. While there, I saw a 'Helen Hull' double amaryllis

in bloom and was, to say the least, impressed. After checking books and catalogs but finding very little mention of double *Amaryllis*, I decided to try some crossing on my own. I crossed 'Helen Hull' with 'Park's Apricot', a single, and when the first seedlings began to bloom, I saved everything with more than six petals. The only colors in my crosses were shades of orange and red.

I joined the PLANT LIFE SOCIETY in the early 70's and read some of Len Doran's articles on his double *Amaryllis*. I began to correspond with him and he made suggestions as to what I should try. I sent slides of my doubles to Mr. Doran and he gave me his comments on each one. Along with the good advice he has sent during the seven years we have corresponded, Mr. Doran also sent some pollen from his 2R5 which I crossed with several of my semi-double lines. In less than two years, I had my first blooms. Following Mr. Doran's suggestion, I dumped plants that did not come up to standard: I was looking for two-toned colors with 15 or more petals and a hose-on-hose petal arrangement. Many had the petals clumped together in the center of the flower (not a very orderly arrangement) and these were dumped. One of the original parent apricots made a great many offsets becoming grassy at times. This characteristic seems to carry on in later generations so perhaps there is a genetic basic for this. The bulbs I have selected over the years make many offsets but do not get grassy looking.

I do all my crossing by taking pollen from my best doubles and pollinating nicely-colored single plants. The color range resulting from Mr. Doran's lines and my lines is wide: solid salmon; light pink; bright orange with pure white center; and many different picotee types (some are almost pure white, while others are almost pink or red with white petal markings).

The percentage of good doubles which result from crossing is very low and poor plants are discarded (they make nice yard plants; my yard is full of culled bulbs). When a new seedling blooms for the first time, it is given a number and allowed to bloom a second time. If it fails to come up to standard the second time, out it goes. One thing which must be remembered about double *Amaryllis* is that the degree of doubleness can vary at different times of the year. Winter blooms are more double on some varieties, while others seem to be unaffected by the temperature.

My *Amaryllis* are greenhouse-grown in a pine bark and sand mixture; the plants receive a constant feed of 200 ppm 20-20-20 and trace elements. Plants grow in full sun all year with no rest period. Watering is done only when the mixture becomes quite dry. Getting the foliage wet seems to encourage red fungus growth on leaves. In the fall, all the old green foliage is cut off to remove any disease or insects. I spray for mites and mealybugs when I notice them. Large bulbs are grown in two-gallon nursery cans and are repotted in the same pot every two years or after offsets are removed. This past summer, I grew seedlings on capillary mats in a bark mixture with "osmocote"; not one plant got root rot. Every three or four months, I drench all plants

with "benlate" and "turban" combination as a preventative. I don't follow the book growing my *Amaryllis*, but I have had good results for the past six years with this method.

This summer I sent slides of some of my doubles to several Dutch growers. Several of them requested trial bulbs, which I have sent, and they are now growing these. I'm hoping they like some of the bulbs enough to buy them.

PLANT LIFE LIBRARY—continued from page 94.

A TERRARIUM IN YOUR HOME, by William White, Jr. and Sara Jane White. Sterling Publ. Co., 419 Park Av. South, New York City 10016. 1976. Pp. 92. Illus. Trade Edition $4.95. The terrarium is described as a miniature indoor garden enclosed in glass, creating a tiny artificial **biome,** or ecological zone. The subjects treated include selecting a container; preparing the soil; planting care; gathering plants; light, temperture and water; communities; synergism and symbiosis; some native plants; plants and animals; and the history of terraria. An index completes the volume.

DISCOVER THE TREES, by Jerry Cowle and Mike Abderson. Sterling Publ. Co., 419 Park Av. South, New York City 10016. 1977. Pp. 96? Illus. Trade Edition $4.95.—This book is dedicated to the young. Sections are devoted to Mother Nature's Bag of Tricks; lots of things to do in the woods; seven famous trees of history; questions to stump your friends and family; and where to find the trees. An index completes the volume. Highly recommended to the young.

WHAT TO MAKE WITH PINE CONES, by Genevieve Ploquin and Boris Toplitzky. Sterling Pub. Co., 419 Park Av. South, New York City 10016. 1976. Pp. 32. Illus.—This charming little book, translated from the French, is concerned with the construction of various objects with pine cones, including Fir Tree Plaque; a shepherd, his dog and his sheep; a fish, a wading bird and an owl; dried bouquet; a bison; and other interesting objects with pine cones. An index completes the volume. Highly recommended.

THE PLANT BUYER'S HANDBOOK, by Richard E. Nicholls. Running Press. 38 S. Nineteenth St., Philadelphia, PA 19103. 1976. Pp. 142. Illus. $3.95 soft cover.—For all house plant addicts this is a handy book to have at hand. The subtitle, "A consumer's guide to buying house plants", does not accurately describe the contents of this paperback book of 142 pages. The text tells the prospective buyer not only how to shop for house plants, but also the kinds of plants you should purchase after considering the environment in which they will be expected to thrive. It also explains the basics of plant care, which are necessary to grow and maintain healthy house plants. The book has several useful features including a glossary of terms, a bibliography, a list of suppliers, and a list of plant societies. A distinctive and innovative chart showing light, temperature, and humidity needs of the various house plants, and their ease of growth, is probably worth the price of the book. This book is a "must" for both the neophyte and experienced house plant grower. **Thomas W. Whitaker**

4. AMARYLLID CULTURE

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

GENERAL AMARYLLID REPORT—1978

RANDELL K. BENNETT, *Chairman, General Amaryllid Committee, 3820 Newhaven Road, Pasadena, California 91107*

The past year has been devoted to contacting amaryllid growers throughout the world, acquiring species, and learning more about the cultural needs of species already on hand. A few words about each of these endeavors may be useful.

Contacting amaryllid growers by correspondence for the purpose of obtaining desired species can be both highly rewarding, and highly frustrating. The rewards are twofold; meeting and exchanging thoughts with growers having a common interest, and acquiring elusive plants. This is often a lengthy process, however. The most difficult task is probably to locate the particular individual who is growing the desired plant. The first logical step is to make a contact in the country where a species is naturally found. Sources written in the past have included botanic gardens, foreign consulates, nurseries, universities, and individual growers. Names of individuals may only result from information provided by institutions, or by articles such as those appearing in *Plant Life*, and other journals. Individual growers in other parts of the world are also sometimes discovered by growers in this country. Hopefully, the word can then be passed on to those interested. Unfortunately, some authors will not respond to letters. Success with correspondence to botanic gardens has been good in the past. Some of these gardens have plant sales (often for members only). Others are willing to exchange species (often only with other botanic gardens but in some cases with individual collectors). If you are able to obtain a response from a botanic garden, they are usually helpful in providing information about a species. This may involve a referral to a nursery, or to a private collector. In some cases a deadend is reached, temporarily, with luck. With some creativity the deadend may be bypassed.

Consulates have been contacted when a doubt existed as to the proper administrative agency to write in a foreign country. A letter to the Australian Consulate in New York has provided the name of an individual involved with agriculture on Norfolk Island. This correspondence is still in process (some question exists as to the frequency of mail delivery to this island in the South Pacific, approximately between Australia, and New Zealand). It is gratifying how precise the consulate can be in providing the name of a specific individual working in a particular field. A current letter has been directed to the same consulate in an attempt to make a contact on Lord Howe Island, off the coast of New South Wales several hundred miles. In this case the desired species is the elusive *Dietes robinsoniana*. It is just a shot in the dark but only time will tell as to the success of this attempt.

Letters to U.S. government agencies are written for the same purpose as those to foreign consulates; to pinpoint a prospective source. A letter to the Trust Territory of The Pacific Islands Agency, based in San Francisco, led to referrals to and individual in the Marshall Islands. A letter to this person was not answered. This is par for the course. Another letter to San Francisco referred me to an individual in the Mariana Islands. This correspondence is still in process, and may never develop into anything but the Trust Territory of the Pacific Islands Agency always responded within five days from the date that my letter was mailed to San Francisco, possibly a record for the government.

Often the last link in the collection by correspondence chain is the nursery or individual. It should be said here that an import permit from the U.S.D.A. is a necessity even though bulbous plant importations are not subject to import restrictions. Some countries, such as Australia, still require a U.S. purchaser to send his green and yellow import label to the seller. The final reward is the receipt of a rare species, long lost to cultivation, or never before found in cultivation. It can be seen that this may be a lengthy process with a low ratio of success. However, the benefits far outweigh the drawbacks. I am still learning much about this correspondence/ acquisition technique, especially in the areas of reference material, lists of botanic gardens, etc.

It is interesting to review the early issues of HERBERTIA, and the advertisements by amaryllid growers. This policy has long been abandoned, unfortunately. This is undoubtedly due to the lack of nurseries who specialize in this sector of the bulbous plants. When a nursery is found that offers botanical species, it is normally only a small portion of the firm's business (an economic reality). Still, it can be disheartening to the amaryllid grower to thumb through a journal such as that published by the Bromeliad Society, and see the number of nurseries that feature bromeliads. If only a fraction of that number existed to specialize in the bulbous plants!

Continued exploration, and introduction of wild species is needed. This always benefits both the species grower, and the hybridist. There are many intriguing species that have either disappeared from cultivation, or have yet to be introduced. A list follows of some of these plants:

Calostemma album
Clivia gardenii
Crinum brachyandrum
Crinum carolo-schmidtii (C. occiduale Dyer)
Cyrtanthus epiphyticus
Cyrtanthus falcatus
Cryptostephanus—all species
Eucrosia—all species
Eurycles amboinensis
Eurycles cunninghamii
Paramongaia weberbaueri
Phaedranassa—all species
Urceolina—most species of subgenus Eucharis

Readers will undoubtedly see species that they are currently cultivating. I would certainly be interested in knowing which species they may have. This list represents just a fraction of the species that should be reintroduced to cultivation, and was assembled from a fast scan of the various genera of the Amaryllidaceae.

The point is that the ground has barely been broken in the area of amaryllid exploration, and cultivation. When one considers the individuals who have devoted their lives to this field, it only goes to show what an evergrowing field this is. No other bulbous family can compare to the Amaryllidaceae for beauty, diversity, and potential. Amaryllid growers may be artificially divided among hybridists, those growing both hybrids and species, and those growing species only. I belong to the latter group. Those who are interested in the cultivation of botanical species know what the feeling is to acquire a new species. Those who have done it on their own, in the field, experience this feeling even more so. It remains for these field collectors to continue their work so that all growers may be benefitted.

Everyone interested in cultivating bulbous plants might try acquiring plants by correspondence. There are people all over the world who are waiting to hear from you. Those who enjoy collecting trips should continue to do so. It is only by observing a species in it's natural habitat that environmental factors (exposure, soil, nutrients, water, air movement) are best anlyzed. This analysis benefits all.

AMARYLLIS CULTURE

E. M. Beckham, *Box 318, Baton Rouge, La. 70821*

Many formulas have been given on the culture of *Amaryllis* and I am sure most of them, as applied, have given very good results. If you have had good results from one of these formulas please continue to use it, as I believe nothing replaces success. The method and experience that I pass on to you have been instrumental in my growing large, beautiful and healthy amaryllis. Horticulture is not my profession, I do this as an amateur like most amateur gardeners. I have no equiptment for sterilization of the soil, ways of controlling temperature, proper lighting etc. My method for potting amaryllis is as follows: equal parts of a good sterilized potting soil, course builders sand (sold as play sand in most nursery and hardware stores) vermiculite to which I add to each 6 inch pot of this mixture, one tablespoon of bone meal, one tablespoon ground oyster shell or dolomite, one tablespoon osmocote (a slow release fertilizer which will feed for three or four months as you water). Mix the above ingredients. The components for this mixture can be found in any feed store or nursery. All of these materials have been sterilized and this is important because of control of fungus diseases etc.

I never use pots larger than five or six inches because *Amaryllis* grow better when pot bound and these sizes take care of bulbs from 24 cm 34 cm. If your bulb is larger you will of course use a larger container.

In potting, place some old pot pieces in bottom of pot for drainage. Hold bulb in one hand applying prepared soil mixture leaving about one half of bulb above soil level. Do not pack soil, apply very little water until leaves or scapes begin to show growth. During growing

season apply a good liquid fertilizer about every two or three weeks.

I grow *Amaryllis* in both clay and plastic pots from year to year, repotting each season. I also remove some bulbs from pots as soon as they have finished blooming and plant them in outdoor beds.

In very cold sections of the U.S. growing *Amaryllis* in outdoor beds is almost impossible, however you can dig your bulbs before freezing weather sets in, store them for winter protection for a period of thirty days or more, then begin with the same potting procedure as explained above.

We here, in the deep south seldom have weather with temperatures below twenty degrees, and can grow *Amaryllis* in outdoor beds very successfully. I mulch with bagasse (sugar cane pulp) and pine straw. Both of these materials do an excellent job. Bagasse however, will protect your bulbs much better in extreme cold weather.

I hope this information will be of some help especially to those of you who are not too familiar with *Amaryllis* culture.

Beautiful *Amaryllis* grown with proper care is really a sight to see during blooming season. I would suggest you attend a local *Amaryllis* show so you can see just how beautiful they can be.

THE ZEPHYRANTHEAE REPORT, 1977

Marcia C. Wilson, *Chairperson, Zephyrantheae Committee*
Brownsville, Texas 78521

The spots covered in this report are undoubtedly among the most beautiful in Mexico. They are now missed by most travelers going on the new highway from Victoria to San Luis Potosi en route to Mexico City. In avoiding the mountains for speed, the travelers really miss a lot.

"Two collecting trips to Mexico in one year? That's indecent!" This was the reaction of Fred Jones when my mother and I recently spent an afternoon visiting with him and his wife Emma in Corpus Christi. The Jones' backyard was spotted with various Texas yellow rain lilies, brought into bloom by a sprinkler. Most were *Z. smallii* (Alex.) Traub, but a few *Z. jonesii* (Cory) Traub and *Z. refugiensis* Jones were in evidence. Well, when you live on the border of Mexico, sometimes an extra trip or so will present itself. An easy afternoon's drive will put you into facinating territory, no matter which direction you take upon leaving the border.

Ciudad Mante was our headquarters for both trips. It is about five or six hours from Brownsville and convenient for many side trips. Following a description of some of these trips, I will review (from a gardener's angle) some of the various Zephyrantheae that have been observed, collected and studied in various depts from the area covered.

I. BROWNSVILLE TO CIUDAD MANTE

Many of the Texas *Zephyranthes* range into northern Mexico. The most notable in the area of this trip are the common white *Cooperia*, *Z. chlorosolen* and *Z. pulchella*. (The white *Cooperia* has many

synonyms. See *New Synonyms—Amaryllidaceae,* by Pierfelice Ravenna, PLANT LIFE 1977, page 37.) The white rain lily might appear in season soon after leaving Matamoros and extends in a number of different directions. A new north Texas location for this species has been reported to me by Dennis M. Speed within the city limits of Sulphur Springs, Texas on low grassy land owned by a local milk producer. This town is northeast of Dallas. The species has been located earlier by Dr. Charles M. Crane 8/10 of a mile away north of State Highway 67 near the MKY Railroad. Dr. Crane also located an "aquatic" form of *Z. pulchella* near Soto La Marina, Mexico, 0.2 miles south of the intersection of Highways 9 and 180. It had quite a nice flower, borne on very tall scapes. Bulbs were growing in 6-8″ of water near ferns and other moisture loving plants. The *pulchella* found around Mante and on the Mante-Tampico highway are rather small and pale in color.

II. CIUDAD MANTE TO CUIDAD MAIZ

We saw disappointingly few rain lilies in bloom on either trip. It was very dry in late May on the first trip and the early spring bloomers were already dormant. Our trip over the July 4th holiday should have given us a greater show, but rains had been late and little foliage was up. The countryside was lush and green in July, but many of the plants and vines had not yet come into mass bloom. Aside from various flowering trees and a few shrubs, most of the spectacular color was observed in private gardens in villages along the way. For collecting purposes, it is wise to take speedometer readings at all towns and small villages and at all major landmarks such as rivers. South of Mante on Highway 85 is a short dry mountain range with some very large and old specimens of *Beaucarnea recurvata.* Their crowns of yellow or mauve dot the mountains and may be seen for miles around. Flowers on branched inflorescences are actually greenish white, but seed capsules change distinctively in color as they mature. *Hectia* is abundant in crevices on almost vertical mountain faces. We turned right at Antiguo Morelos on to Highway 80. A day of each trip was spent on this interesting mountain road between Antiguo Morelos and Ciudad del Maíz. Distance between Mante and Maíz is only 144 miles round trip, but elevation reaches near 5,000 feet between El Naranjo and Maíz and one should never drive after dark in Mexico. This precaution is dictated by stray animals and uncertain road conditions and advised by all travel agencies. Unleaded automobile fuel is also available only in major towns.

The roadside collecting area for *Zephyranthes* sp. Clint M-522 was dry and deeply cracked the first trip, but we found two or three of the cream colored flowers in July. Both cream colored and yellow flowers have been observed in the drainage ditch next to the road as you pass through a valley before you reach the gorgous El Naranjo river. In years past, mass bloom has been spectacular. The short drive to the El Salto waterfalls is very worthwhile after the summer rainy season

has started. Commerce and farming had stripped the entire area of Cycadaceae between my last trip in 1970 and this one in 1977. I had particularly wanted to collect a special dwarf form of *Zamia fischeri* which is sometimes found in the wet mountains beyond El Naranjo. Always rare, it is about non-existent now close to the road. After any number of stops on both trips, I finally found a small plant that had regenerated from a broken underground trunk. Years earlier, my parents had witnessed the disappearance of special orchid species in this area. It happened in less than five years between the late '40s and early '50s. Thousands of the plants were stripped from the oak trees because of a market for the blooms in Mexico City. This is still a facinating mountain rain forest with an abundance of *Tillandsias* in the oak trees and ferns, begonias, flowering shrubs, vines, etc. growing in the rock crevices along the road. We collected a purple native *Achimenes* near El Platanito. Mother had seen a specutacular display of bloom on these plants the previous July, but they were just coming into bloom this year. It was close to this area and near another village called Los Abritos that I found the first forest *Zephyranthes* I had ever seen. The flowers were pink, small and rather ordinary, but what a curiosity to find them blooming in such deep shade! Of course, all *Zephyranthes* in this wetter wooded area grow in part shade.

If we missed the reason for our first trip in late May—to find *Zamia fischeri* before lush undergrowth covered them—we also missed the reason for a duplicate trip in July. This was to see masses of *Tigridia* in bloom. We found leaves, but not a single bloom.

Puerto de Lobos is a valley between the wet and dry sides of the mountain range. It was right above here that I was startled to see white *Zephyranthes* in bloom. Sure enough, it was the white *Cooperia*, Clint M-292. I knew this closely resembled *Z. traubii* (Hayward) Moldenke that I collected frequently in Galveston, but this was the first bloom on 292 that I had seen in the wild. Bulbs were growing in crevices and on the usual rock ledges, but appeared to be identical to *Z. traubii* (bulbs, flowers and seeds). There is, however, an important difference in the 2n chromosome number. *Z. traubii* is an unusually low number of 24 (Dr. Walter Flory's count reported in PLANT LIFE 1975, page 82) and Clint M-292 is the more common number of 48 (Dr. Raymond Flagg's count in his PhD Dissertation, INVESTIGATIONS IN THE TRIBE ZEPHYRANTHEAE OF THE AMARYLLIDACEAE; The Alderman Library, University of Virginia, May 1961, page 62). Growing along with this species, but not in bloom, we found *Zephyranthes* with very large bulbs and very wide leaves (¼" or more). This is probably Clint M-155 or similar.

From Puerto de Lobos south to Cañon de Borregos the climate changes quickly to dry. It is in this area before the short descent into Ciudad del Maíz that my parents collected so many different rain lilies, including *Z. clintiae* Traub. (*Zephyranthes Clintiae* sp. nov., Hamilton P. Traub; PLANT LIFE 1952, pp. 74-76. "Exploring for Mexican *Zephyranthes,*" Mrs. Morris Clint; PLANT LIFE 1952, pp. 77-79.

"Collecting Amaryllids in Texas and Mexico;" Mrs. Morris Clint; HERBERTIA 1957, pp. 10-22.) It must take a great deal of rain to activate these dry land bulbs and I'm sure that most had bloomed in April and early May. At any rate, we found next to nothing in this area on both trips. We walked quite a distance near Cañon de Borregos and collected just a very few bulbs in leaf. I dug several attractive small species of cacti, although I understand there are more numerous interesting species from Maíz to Huizache. Dr. Thad Howard once found a lovely large white *Zephyranthes* growing under oak trees in a colony with similar pink ones. This was just the other side of Cañon de Borregos, near the top of the rise. We stopped for a cold drink along in here and saw absolutely nothing but some bright orange mushrooms that would have been beautiful to photograph. Most of the rain lilies here are in shades of pink to dark rose-red in a variety of shapes and sizes. Heaviest bloom should be April to mid-May, with foliage growing later with the heavier June rains. This area has been fenced for cattle and goats for the last five years or so. I hope this has not disturbed the rain lily population.

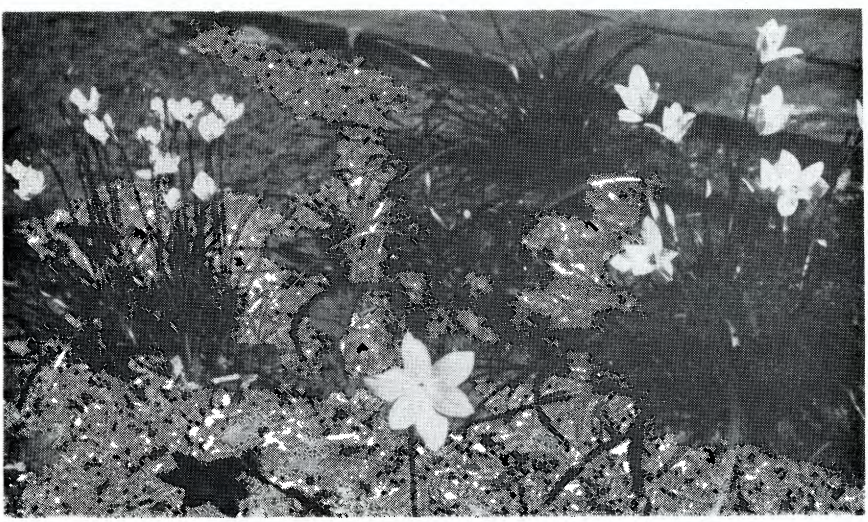

Fig. 21. **Left, Zephyranthes,** sp. Clint M-375, Tamazunchale, Mexico. **Right, Zephyranthes insularum** (West Indies), from a garden in Valles, Mexico; and **Lower center,** foreground, **Zephyranthes macrosiphon,** a large form of Clint M-30, south of Tamazunchale, just over state line of Hidalgo, Mexico. Photo by Mrs. Morris W. Clint.

III. GOMEZ FARIAS, "RANCHO DEL CIELO"

Somewhat north of Mante, beyond the town of El Limón, we turned left back toward the mountains for the short drive to Gomez Farias. Beyond the town is an unpaved road (4-wheel drive is necessary) to the late Frank Harrison's "Rancho del Cielo." The property was

deeded to Brownsville's Texas Southmost College and is quite an attraction for bird watchers, plant lovers and photographers. A pretty rain lily, pink with a white center, comes from here. This is Clint M-522, a *Z. macrosiphon*-type. Gomez Farias is a narrow settlement on a ridge up the mountain and is a particularly charming and beautiful village with bananas, mangos, avocados and even a coffee crop. The gardens, no matter how small, are ablaze with color of cultivated plants. Bundles of *Chaemadoria* leaves, fresh from the jungle above, were being loaded on a truck bound for city florist trade. The road up to the village is somewhat dry, but plenty tropical looking during the rainy season. In late May the *Bromelia* species was in bloom and the maidenhair ferns were beginning to come out. In July, the numerous vines were beginning to bloom and we were relieved to see a few *Dioon edule* growing in the rocks with *Bromelia*. The *Dioon edule* is such a common cycad in Mexico, it is a shame to have it removed from the roadside to satisfy the wants of the commercial collectors. Back on the road to Maíz, out of sight in the woods, we found a pile of 25 of more *Dioons* full of rot and bugs. They must have been too small.

A little further north of Mante is a paved road to Ocampo. This is a rather dry, uninteresting mountain drive. With a four-wheel drive, I understand the gravel road from Ocampo to the lumber camp north of Gomez Farias is extremely interesting. This passes through another rain forest.

IV. CIUDAD MANTE TO TAMAZUNCHALE, CIUDAD VALLES

For our second trip we were given the name of a man in Mante with a truck. Since we wanted to go on the old graveled road to Xilitla, a number of miles south, this was a ridiculous business proposition, but the man was well recommended. It was even more ridiculous when, over an hour late, two young near-relatives showed up in a different truck. We lost a prime four hours of daylight time, mostly spent along the road in the hot sun waiting for the broken-down truck to catch up with us. For me, however, it was my first visit even a short distance up this road, and worth anything for the glorious experience. The sixty miles to Ciudad Valles on Highway 85 is a rather uninteresting trip, but the city is a large bustling community no longer dependent upon tourist trade. In May, 1971, Dr. Thad Howard found a tiny white flowered *Zephyranthes* a mile or two north of the city. "It had a pinkish exterior flush (like most whites) and almost had the texture of crepe-paper. Really a weency-mite and hard to see even when staring directly at them a few feet away. It was much like *Z. verecunda*, but a bit smaller, and it had a fair pedicle." Small light pink *Zephyranthes* were found in 1962 by Mrs. Robert H. Steude of Houston, Texas. These were growing south of Valles near the Hotel Covadonga by the river. I believe the common white *Cooperia* grows here too. One of the most important discoveries, however, is Dr. Howard's "Valles Yellow". This light yellow *Zephyranthes* species was found by him in July, 1953 blooming in a roadside ditch about 24.5 miles south of Valles. This rain lily is extremely adaptable and is as everblooming as *Z. smallii* in

south Texas. If we had not been pushed for time, we possibly could have found some in leaf, but they are rather messy to dig when found in standing water. The paved road to Xilitla turns right about 22 miles before reaching Tamazunchale. I doubt that we would have found bloom on this trip, but several pink *Zephyranthes* grow near this town. Clint M-30, identified as *Z. macrosiphon* by Dr. Traub, is a large and beautiful pink rain lily which may be found both north and south of Tamazunchale. My mother had collected a very few of these in scattered bloom in July 1976. I understand that a hillside of these in bloom is really a sight to look forward to, and many variations in color shade, size and form may be observed in a large colony in bloom. In 1953, Dr. Howard found his 53-3 "Crepe" north of Tamazunchale. This one, somewhat related to the *Z. clintiae* complex, has pink flowers with a white center and keel, rather small with a crepe texture. Another charmer is Clint M-375, which was collected by L. E. Guerra of Mission, Texas in 1953. A number of these bulbs were found blooming along the banks of the Rio Moctezuma east of the town.

Vegetation south of Valles becomes increasingly interesting as the elevation rises. Valles is noted for its great stands of bamboo, which have been somewhat reduced in number by disease in recent years. A number of beautiful tropical flowering trees, fruit trees and palms have been introduced into this area of Mexico, but there are also some very unusual things that are native. The Palo del Rosa *(Tabebuia pentaphylla)* had been spectacular in April, we were told, and we saw a very few blooms still in July. Large stands of *Sabal mexicana* are disappearing from the roadside, but a few of these and *Acrocomia mexicana* may be seen. There is a large tree with purple flowers growing along the highway and any number of legume and daisey trees of different colors. I hadn't realized that several of our local popular small flowering trees were native to drier sections here: the yellow-flowered Experanza *(Tecoma stans)* and both the yellow and orange Chinese oleander *(Thevetia)*. The population near Tamazumchale has increased and the patterns of small cultivated areas and land erosion form a tapestry on the shear mountain sides all around. It is an unforgettable sight.

V. XILITLA

We stopped at the intersection of the Xilitla road to wait again for our truck and I investigated a small shady cove nearby. The walls were lined with moss and two kinds of *Peperomia*, one a little vine with tiny thick round leaves that I had never seen before (like a plain leafed *Peperomia prostrata*). All of my life I had been hearing about "the old Xilitla road" from different people, and all of the superlatives fit this small area so close to Texas. We followed the new paved road for a short distance and turned to the right on a gravel-stone road which leads past the castle. This is where we had to stop, picnic and watch our time. The castle. It is actually a multileveled stone structure with cement pillars, arches and decorations built by an Englishman in the

1960's. The building, raising up in the jungle like part of the mountain-side, already looks as if it has been here for hundreds of years. It is so unreal and architecturally grotesque in this setting that it is truly beautiful. A natural waterfall has been damned for bathing and all sorts of little walk ways have been constructed of stone and cement on both sides of the road, leading down toward the water. With no one around to ask permission, we picniced in a covered pavillion with table, cement ledge for seats and a small faucet to wash our hands. Across the road was a palm thached roof over a small pavillion or landing on the way down further to the creek. The roof was on the same level as the road and was covered with blooming impatience! This unpaved road continues on up around the mountain and exits somewhat north of where we started on the main highway. If we ever locate the proper vehicle to carry our lunch and gear, we should like to walk the distance of this entire road.

Mother and I chose to walk back to the main highway in order to give me a preview of what might be found in this tropical rain forest. I had been impressed with the number of different ferns that grow in the mountains toward Maíz, but here you count in tribes, not genera. *Polyposium aureum sporadocorpum* is a grey-leafed hare's foot type that grows in the trees with orchids, *Bromelliads, Ripsalis* and no telling what else. The native *Heliconia* adapts beautifully to Brownsville's climate, as well as several rhizomatous *Begonias, Calathea, Pilea, Tradescantia, Philodendron* and *Monstera.* We passed over a number of different and familiar *Peperomia,* but I couldn't resist two *Selaginella* species for a terrarium. We found the same *Achimenes* species here in a sheltered spot, but it was soon to be overtaken by more lush summer growth. It was too soon for many vines to be blooming, much less to have ripe seed, but we recognized a *Thunbergia.* One vine with bright orange inflorescences with tiny flowers had us stumped. It was *Cissus cucurbitina* or something similar. We were on a very well traveled road and viewing just a few of the more ordinary exotics of a lower elevation. This mountain range around Tamazunchale is noted for a number of different Cycadaceae species and varieties. We saw one lone *Ceratozamia mexicana* growing high in a rock crevice. For a time in this giant greenhouse, rain lilies were forgotten; but they are probably up there too.

MEXICAN ZEPHYRANTHEAE IN THE ORDER OF THE TRIPS

(a) Brownsville To Ciudad Mante
(b) Cuidad Mante to Cuidad del Maiz
(c) Cuidad Mante to Tamazunchale

Z. chlorosolen (Z. herbertiana) - Common white flowered, subgenus **Cooperia.**

Z. pulchella - Found on the East Coast of Mexico. Flowers generally small and paler yellow than Texas the type.

Z. sp. Clint M-550 - Medium-small, pale yellow flowers fading to cream colored, pointed segments, roundish bright green foliage. Somewhat similar to "Valles Yellow", but not as adaptable or ever blooming. A deeper yellow flowered species grows with this, possibly the same type.

Z. sp. Clint M-292 - Star shaped, open, two-inch white flowers, elevated

tiny stigma, subgenus **Cooperia.** Size of bulbs, color of bulb tunics and flower parts appear quite similar to **Z. traubii,** although the 2n chromosome number has been found to be higher (see earlier reference). Grows in part shade on rock ledges, semi-wet mountain forest.

Z. Clintiae Complex - This term has evolved to cover the myriad of rain lilies found in and near the type locality. It is also a convenience when used to describe **Zephyranthes** found in other parts of Mexico when flowers share the same general cup-shaped appearance and certain other characteristics like small, capitate stigma. Color of flowers ranges from white to pink to dark rose-red. Heaviest bloom is from April to mid-May. Listed below are a few collections with brief non-scientific notes.

M-154-155 - Medium to dark rose, full petals, ruffled or course textured. This is one of the larger flowers produced from large bulbs with rather wide, flatish leaves. It grows with M-292 above.

M-16, 471, etc. - **Z. clintiae** as described (see earlier reference). Small, dark rose-red flowers with full wide petals, somewhat cupped or crocus-like. Leaves upright, rather narrow, channeled, with maroon at base. Dry mountains with scrub oak. 2n=48 "(**The Zephyranthes Clintiae** Complex. I. Initial Report on the Somatic Chromosomes;" Dr. Raymond O. Flagg; PLANT LIFE: 1960, pp. 86-92).

M-22 - Bright pink flowers, white in throat, good substance, opens flat.

M-25 - Same as **Z. clintiae,** only much larger and perhaps easier to maintain and bloom.

M-26 - Large open, star shaped flowers, long narrow petals.

M-72 - Tiny cup-shaped flowers, rose and white.

M-176 - Large, rose pink, robust grower under cultivation. Flowers are somewhat coarse.

M-217 - Medium sized flowers, pink with white throat and deeper pink spots around center. Easy and rather robust like M-176.

M-630 - Lovely large light pink open flowers, 6-½ cm., broad petals, white to greenish throat. Filaments distinctly two lengths, stigma deeply trifid.

M-557 - Flowers dark rose-red, large, fading to orchid. Segments long, narrow, open and somewhat floppy. Stigma narrowly trifid, long style. West bank of Cañon de Borregos. Possibly due to long drought or change in upper water shed, the roadside area here is no longer as distinct as it once was and there is no longer a bridge or culvert at the base.

Howard's White Zeph. sp. - Three inch white flowers, open, broad petals, somewhat like **Z. grandiflora.** Bulbs growing under oak trees beyond Cañon de Borregos, just east of Maiz. Similar pink flowering bulbs in colony. Difficult to maintain.

Clint M-522 - Flowers medium-large, pink with a white center. Dependable bloomers, appearing in July or earlier with heavy rains. A **Z. macrosiphon**-type close to M-30 from Tamazunchale, although this grows further north at "Rancho del Cielo".

Howard's Tiny White **Zeph.** sp. - After years of collecting bulbous plants in Mexico, Dr. Howard found this new little white **Zephyranthes** just north of Valles in May 1971 (see earlier description).

Z. sp. Steude's "Valles Pink" - Small, light pink **Zephyranthes,** found a few miles south of Valles by the river. My notes are skimpy on this one, but the river should be the El Naranjo, or branch by another name, which originates northwest of El Naranjo on Highway 80.

Howard's 53-1 "Valles Yellow" - Found about mid-way between Valles and Tamazunchale on the west side of the highway in a ditch, this yellow rain lily is important for several reasons. Its 2n chromosome number is 28 (the most common number of Mexican **Zephyranthes** studied is 48). ("Chromosome Diversity in Species, and in Hybrids, of Tribe Zephyrantheae." Dr. Walter S. Flory. The Nucleus: Seminar on Chromosome, 1968: 79-95.) This species is easily grown from seed and is a dependable repeat bloomer. Although it is a bog plant in habitat, it does not seem to be fussy under cultivation.

Howard's 53-3 "Crepe" - Small, rose-pink, with white center and keel; crepe texture. This was found in July north of Tamazunchale and is possibly related to the **Z. clintiae** complex, but from a low elevation.

Clint M-375 - This perky pink little **Zephyranthes** was found almost in the town of Tamazunchale in late summer along the banks of the Rio Moctezuma. Bulbs and flowers are small and foliage is narrow, fleshy, bright shiny green and deeply channeled. It offsets freely and blooms mid-summer into fall; appreciates light shade. M-375 is probably related to **Z. macrosiphon,** but is rather distinct in its habits.

Z. macrosiphon - Clint M-30 was found by my brother, Morris Clint, Jr., in 1947 in a creek a few miles north of Tamazunchale. It was identified as **Z. macrosiphon** by Dr. Traub. A site with more abundant numbers was later discovered south of the city, just beyond the state line of Hidalgo, The finest forms of this species are quite large, pink with a white center, and bloom on stout stems in July and August. Leaves are broad and rather flat. Leaves of the "Rancho del Cielo" **macrosiphon** are more narrow, channeled and dull green. In 1970, we found still another **macrosiphon**-type west of Valles on Highway 86, half-way to Rioverde. These flowers had lovely form, cool pink with white center, but proved difficult to bloom under cultivation. They were growing in almost pure gravel, with roots in a sandier strata.

1978 **NERINE** REPORT FROM HOLLAND

G. A. M. Zuidgeest, *Middelbroekweg 71, Honsetersdijk, Holland*

Nerine sarniensis and many of the hybrids are subject to bulb rot. The rotting appears especially during the rest period from the middle of April to mid September. Moisture applied to the bulbs can be disastrous during this period.

The rot begins above the bulb-necks and in the course of time penetrates inside the bulbs, and the new growing points may be affected leading to the loss of the bulbs.

The onset of the rot is caused by the entry of dew, etc., under the dry leaf-bases at the bulb-neck. The symptoms show-up as red-brown spots, which resemble fusarium or sometimes rhizoctonia.

It is our practice to immerse all Nerine bulbs in a solution of Benlate 4% for an hour and a half. The bulbs are then planted immediately. But this procedure does not appear to be sufficient. Therefore in early spring (March) we also water the plants with a solution of Benlate 4%, and repeat this treatment in April. We hope by this treatment that the Benlate will soak through the leaf-bases at the bulb-neck and reach the inside of the bulbs.

Experience seems to indicate that *Nerine sarniensis* and the hybrids grow best in soil mixed with some old cow manure, or a similar mixture. In my opinion, the best we can do, when the bulbs are grown in pots, is to fill the lower half with peat litter and the upper half with coarse granular sand. If the sand is too fine, there is the chance that the soil will be compacted and become green with algae which restricts growth.

During the rest period when grown in pots, we place the pots in saucers with water overnight, thus allowing the roots to take up moisture.

Many of the Nerine clones start root growth during the middle of

July. Water them overnight to give them a strong start. It is good practice to repeat this once in August and September. In October growth is advanced far enough so that water from outside does not encourage bulb-neck rot. With the windy weather, we give most water in November, December and January.

GROWING AMARYLLIDS IN THE MIDWEST

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In addition to the *Hymenocallis* discussed previously (Shields, 1977), several other genera of the Amaryllidaceae have been grown for the last few years.

A species which finds a multitude of uses is *Habranthus robustus.* This little plant, which offsets profusely, blooms in the shaded bed as a border in front of the *Fuchsia, Impatiens, Achimines,* and *Begonia* hybrids. It also flourishes in full sun as a border for the bed of summer bulbs. The one place it does not bloom well is in the greenhouse in pots. It is, of course, not hardy, and the bulbs are lifted each autumn for storage. The little Texas Copper Lily, *Habranthus texanus* (properly *H. tubispathus*) does grow and bloom in pots. It is apomictic when pollinated with *robustus,* yielding progeny identical to the seed parent. One desert species also has bloomed in the greenhouse: *H. concolor.* This plant gives only a single scape in any one year, but has been producing two large, healthy offsets each season. This species is very susceptible to mites, for which a satisfactory control is Plictran ® applied two or three times during the growing season. If a potted bulb of *concolor* is allowed to spend the summer out on the patio, it will survive but without vigorous growth. In our climate, *Habranthus concolor* is a greenhouse plant.

Sprekelias are attractive and reliable bulbs for spring bloom in pots or for early summer bloom directly in the outdoor beds. No problems have been encountered in obtaining bloom from *Sprekelia formosissima* f. *williamsii, S.* "Orient Red", *S.* "Maxine" (Howard), or the Woelfle seedlings. All may be stored bare in the heated garage at 50-60°F each winter. Leaving bulbs potted year-round has not been attempted. Several hybridizations have been tried, but none of the seedlings have yet reached blooming size. Eagerly awaited are young bulbs of "Orient Red" x *williamsii* and "Orient Red" x "Maxine". Closest to blooming size are a pair of seedlings from a cross of ("Aztec Idol" x "Superba") x ("Inca Queen" x "Orient Red"). The pod parent is a Woelfle seedling, and the pollen parent is a Clint hybrid seedling; both parents were received from Dr. Thad Howard.

Two varieties of *Crinum* provide attention-getting specimen plants in large tubs every summer: *C.* "Ellen Bosanquet" and *C.* "Cecil Houdyshel" are both beautiful and reliable. The tub of "Cecil Houdyshel" blooms several scapes in June and July, followed by "Ellen Bosanquet" with two scapes in succession in August and September. Stored in the garage during the winter, neither variety goes completely

dormant. At one time, a plant obtained from the same commercial source as the "Cecil Houdyshel" but labelled "kirkii" bloomed in precise synchronization with "Cecil Houdyshel" several times in succession. Moreover, the flowers seemed indistinguishable to this writer. The foliage of "Cecil Houdyshel" may be slightly wider than that of the "kirkii", as judged by the two aforementioned plants. Nevertheless, some doubt remains as to the true identity of the plant referred to here as "Cecil Houdyshel". *Crinum moorei* has yet to bloom after many years. It produces abundant offsets, and has pushed itself out of a series of ever larger pots, by its vigorous root growth. Still no blooms appear. *Crinum submersum* blooms in some years, always with only a single scape in any one season. My ambition to cross *moorei* and *submersum* seems to be doomed to permanent frustration. Another stubborn non-bloomer has been *C. zeylanicum*. Any sensible gardner would have long ago consigned it and *moorei* to the compost pile.

INSECT PESTS

Mealy bugs have been a much more troublesome problem than mites in recent years. The Lily Mealy Bug, *Chorizococcus lounsburyi* (Brian) an insect of the order HEMIPTERA, has been identified as the culprit by Mr. Virgil Knapp, of the Indiana State Entomologist's office, with confirmation from the USDA in Washington. This, according to Mr. Knapp, is a new state record for this pest. The insect has been found on bulbs brought into winter storage after growing out in the garden for the summer, and also on greenhouse plants. Its skin is protected by a waxy exhudate, so that very strong detergent concentrations are required if aqueous sprays or dips are to be effective. Furthermore, most organophosphate insecticides, such as malathion, Cygon-2E ®, and diazinon, are toxic to many plants in the Amaryllidaceae. Some control has been obtained using chlordane 50WP as a dusting powder, but this does not give total eradication; nor can it be recommended for this, as this is not an approved use for chlordane. Zectran EC is still available in garden stores and is a strong insecticide of the carbamate family. It is currently being tried by the writer for control of the Lily Mealy Bug, using 2 Tbsp. per gal. with generous addition of spreader-sticker. The bulbs are soaked in the solution for one-half hour or longer, then dried in air for 2 days before being put into winter storage.

PANCRATIUM FOR WINTER-RAINFALL GARDENS

Richard E. Tisch, *20516 Clark St., Woodland Hills, Calif. 91367*

In the Los Angeles area of Southern California we can expect no significant rainfall from May 15 to October 15. Up until recent drought-affected years we have lavishly poured water from hoses and sprinklers onto our lawns and gardens. Now, however, we are looking more favorably toward those plants which can survive, even flourish with

little or no watering during our dry season.

Traub discussed this briefly in 1961 in Plant Life,[1] mentioning *Brunsvigia* and *Nerine* and suggesting that there are others which prefer the dry cycle during the summer months. One such is *Pancratium*, with possibly some care necessary in selecting the species to grow. I have seen several types flowering in local gardens, apparently without constant watering. In particular, one clump has held my interest for over 20 years.

Fig. 22. **Pancratium maritimum** as grown by Richard E. Tisch in southern California.

Growing up against a chain link fence facing the street in front of a home that was built in the 1940's, it has sent up its *Narcissus*-like glaucous leaves every winter, and many scapes of pure white flowers every July-August. Shaded from the morning and noonday sunlight by Pepper Trees, it withstands the glaring afternoon and early evening sunlight during our long hot summers here in the San Fernando Valley. In the winter, during our on-again, off-again rains which rise to downpours, the umbrella covering of the trees prevents it from receiving direct soakings.

When the owners moved from the house five years ago, digging some

bulbs from around the edge of the clump was tried. From the rock-hard adobe only a few bulbs were finally extracted. One flowered the following summer in a border alongside a lawn; another sent up some leaves in the winter but apparently rotted from too much daily watering during the sumer. The second year, the first bulb clump apparently died, probably for the same reason.

The following August, several scapes with seed pods were gathered from the clump. They were placed in shade in a pitcher half filled with a nutrient solution, *plus colchicine.* A month later 119 large triangular cross-section, pear-shaped seeds were planted in a plastic dishpan in a standard potting compound, loose and well drained, with exploded mica on top. Most of the seeds germinated, but many were albino; the latter died, leaving only 34 seedings for transplanting outdoors.

Of the 34 set out in a bed with a sunny exposure, in loose, fast-draining soil, 23 survive today. One is noticeably much larger than the balance. For two years I was at home and able to restrict the amount of water given to the plants during the summer months. Then my work took me away frequently, and the youngsters charged with watering our plants made sure that every plant in the yard was regularly soaked, and some of the plants dwindled and disappeared. This summer, four years after sowing, three plants have flowered and the fourth, the largest, is sending up an oversized scape. The flowers, when put in a small bud vase in the house, produced a fragrance that created an arresting aura for several feet, with a sweetness that hung in the air for hours.

With the added suggestion that they perhaps would flourish even better if grown in a location which provides shade during part of the day, I unconditionally nominate such a plant for your Winter-Rainfall Garden, and will glady send a few bulbs to anyone wishing to try growing them in this fashion.

LITERATURE CITED

1. Traub, H. P. 1961. Winter-Rainfall Garden in Southern California. PLANT LIFE 17: 113-114.

(See also article by V. Roger Fesmire in the present issue of PLANT LIFE.—H. P. Traub).

1978 ALSTROEMERIA COMMITTEE REPORT

DONALD D. DUNCAN, *Chairman, Alstroemeria Committee, P. O. Box 238, Sumner, Washington 98380*

This past year was the first time that cut Dutch Hybrid *Alstroemeria* have appeared in the Seattle wholesale florist markets. I believe these are of the Regina Hybrids. They have long straight stems and the flowers come in near white, creamy yellow, yellow, orchid and pink.

I have tried to find the names of the growers in California who are producing these, but as yet I have been unsuccessful. I would like to correspond with them or visit their operation and report on it next

year. Perhaps someone reading this can supply me with the information I need.

Professor Harold Wilkins of the University of Minnesota at St. Paul and his graduate student assistant, Royal Heins, have been doing research on the commercial growing of *Alstromeria*. They too are working with Regina Hybrids which were produced in the Netherlands.

As pointed out in their articles that have been published in the FLORIST REVIEW MAGAZINE, these *Alstroemeria* grow best at a temperature between 50 to 55 degrees Fahrenheit (10 to 12.5 degrees C.). They appear to have two blooming cycles per year. The spring production begins in March and peaks in May. The plants stop flowering in June and then produce a second crop from September to December. I am sure we can look forward to much more cultural information on the greenhouse production of *Alstroemeria* from Professor Wilkins and his assistant in the future.

I also wish to make note of the surprize visit paid me this last summer by Gerard Zuidgeest, the foremost hybridizer of Nerines in Holland, and by Hans Rood, a Dutch importer of exotic seed.

It was one of those damp, grey, rainy evenings for which the Seattle area is famous, that these gentleman arrived at the greenhouse to see my *Alstroemeria* collection. I am afraid that they expected to find a growers range of greenhouses. I am not a commercial grower. I have one greenhouse only, devoted more or less to *Alstroemeria*. However, they did show interest in my collection.

We then retired to the shelter and warmth of my home to view Mr. Zuidgeest's color slides of his beautiful Nerines. Besides his breeding program, which has obviously produced many wonderful colors, Mr. Zuidgeest is working on perfecting the forcing of Nerines so that they could be brought into flower on a planned schedule, thus producing cut flowers all year long. It is hoped that he can be persuaded to write an article for a future issue of PLANT LIFE.

AMARYLLIDS ON A DRY HILLSIDE *

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In the late summer of 1972 we moved from Torrance to Perris, going from a rather cool coastal climate near Los Angeles to one of the hot interior valleys of southern California. In the moving we took along all those bulbs that we thought might grow in a semi-desert climate, where the temperature reached 110° F. in summer and dropped to about 24° F. in winter, with very little rainfall. As might be expected, some bulbs did not survive long, some grew but never bloomed, while some really thrived and gave us some very welcome suprises.

Arriving in Perris, a garden was soon laid out on a steep, rocky

* See Article, page 101, PLANT LIFE 1971, for last of previous contributions.

hillside, spotted with huge boulders. Near the base of the hillside, within a semi-circle of these huge boulders, the bulb garden was established, and here most of the bulbs were planted, although a few were left in large pots on the patio at the rear of the house.

AMARYLLIS AMBIGUA

One of the bulbs that really thrived was *Amaryllis ambigua,* a long trumpet species with pink and white flowers. This had been received from Dr. Ruppel of Argentina in 1967 as a very large bulb, but grown in a pot at Torrance, it never bloomed, and grew so poorly that the bulb became smaller every year. Here at Perris, it apparently found a climate that suited it, for it began to grow vigorously, sending up many large leaves both spring and fall, and blooming with two scapes every summer. When we moved back to the Coast in December of 1976, this bulb was again put into a pot and taken along. It sent up a flower bud in the spring of 1977 and another one in the fall, but both failed to make it through the neck of the bulb. Neither did it grow any new leaves until the fall months; so I have doubts that it will ever bloom again. The lesson from this experience is obvious.

AMARYLLIS AULICA

Three varieties of *Amaryllis aulica* were planted in the bulb garden: one variety known as "Robustum", another one bought many years ago from Van Tubergen in Holland, and the variety *Stenopetalum.* This latter gradually vanished and was lost, the variety from Van Tubergen grew but did not bloom (although it had bloomed infrequently grown in a pot), but the variety known as "Robustum" not only grew but flourished, blooming faithfully every spring. It might be noted that this bulb has such wide leaves that it just might be a hybrid of *A. aulica* rather than a variety of the species, although it rests in summer and sends up leaves in the fall.

AMARYLLIS

Amaryllis papilio grew very well, but the foliage was considerably smaller than when grown nearer the Coast, and it never bloomed at Perris. It also lost most of its leaves during the winter months. Planted in a large pot again when we moved back to the Coast in December of 1976, it gradually went completely dormant, and did not begin to grown again until the fall months. Perhaps now it will decide to bloom. A hybrid of *A. papilio,* received from a friend in Passadena in 1975 as a mature bulb with offsets, was kept in a large pot on the patio. This grew fine and bloomed with dull brownish red flowers twice a year at Perris, but isn't doing so well since moving back to the Coast. Some small and medium-sized bulbs of the large-flowered *Amaryllis* hybrids were also planted in the ground at Perris, but all were failures.

OTHER AMARYLLIDS

The majority of the bulbs planted were other memmbers of the

Amaryllis family, many of which are more suited to a hot, dry climate than the genus Amaryllis. All of the Brunsvigias did very well, a large white-flowered variety being especially beautiful. A *Zephyranthes* with white and yellow flowers grew to perfection at the base of a large rock. During one blooming spurt we counted close to fifty flowers in bloom on one small clump. I should have tried other varieties of the Rain Lilies, as probably all would have flourished here. A white flowered *Narcissus* was also very free-flowering in full sunshine.

Some bulbs grew satisfactorily, but the foliage did not like the intense sunshine and perhaps they were not watered enough, bulbs such as *Tulbaghia fragrans, Paramongaia,* a dwarf *Hemerocallis,* and *Agapanthus.* The dwarf *Agapanthus* hybrid "Peter Pan" was planted in full sun further up the hillside, and while it bloomed very well, the leaves became smaller each year. When a piece of it was put into a large pot and kept on the patio in partial shade, it at once more than doubled in size, but did not bloom quite as profusely. The regular variety of Agapanthus did very well when grown on the north side of the house.

Four species of *Lycoris* were planted: *albiflora, radiata, squamigera,* and *aurea.* The last named vanished at once, *L. squamigera* struggled through one year and then gave up (although it grew well in Colorado), *L. radiata* grew and multipled but never bloomed, while *L. albiflora* both grew well and bloomed nicely; its white flowers tinged a pale yellow were a decided asset to the bulb garden. One of the biggest surprises came from a flower somewhat simimlar in appearance to *Lycoris albiflora,* namely a bulb labeled *Pancratium maritimum.* This bulb had been grown for many years in a pot, but I don't recall it ever blooming before. Here in the ground on a well-drained steep hillside, it grew luxuriantly and bloomed for a long period every summer, the leaves remaining evergreen all the year. (See also article by Richard E. Tisch in the present issue of PLANT LIFE.—H.P.T.) Back into a pot again when we returned to the Coast, it reverted to former habits. Again, the lesson is obvious.

Most of the *Hymenocallis* species, and all of the Crinums, were left behind in Torrance when we moved to Perris, as I did not think their foliage would take the sunshine and heat. However, *Hymenocallis littoralis,* was brought along and planted in a narrow space between two tall boulders, where it was shaded much of the day and probably had access to more soil moisture. At first it did not do too well, but finally after three years, it suddenly began to grow luxuriantly and sent up three or four huge flower scapes with very large white spider flowers; it was magnificent! This species had been my smallest one when grown in a pot, and that is why it was brought along, but here it evidently found a location that suited it perfectly. To grow these exotic plants from around the world, it is obvious that one must attempt to approximate their native habitat, or expect nothing but failures.

Many other plants were also grown successfully, such as *Nerine bowdenii* in the ground and *Alstroemeria pulchella* (the Brazilian Parrot

Lily) in a large pot on the patio, but the highlight of the winter blooming season was a hybrid Nerine with vivid "pink" flowers. During the Christmas season it furnished a brilliant spot of color in the garden, and it is just as good when grown in a large pot. It is evergreen and flowers easily and abundantly and is a more compact plant than *Nerine bowdenii*. If I could have only one Amaryllid, this one would be my choice. Needless to add, it will always move with me, for it is not fussy about its environment, and is now growing fine in a pot on our patio only two blocks from the Pacific Ocean.

LEAFHOPPERS ON AMARYLLIDS

Randell K. Bennett,
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This past summer was marked by an invasion by a species of lateral moving leafhopper. These small (0.3″), speckled insects are normally found on the underside of leaves. The species seen in this locale had a remarkable ability to avoid capture, and observation by moving laterally around a leaf, out of view. I should not refer to them in the past tense, since they are still around.

Leafhoppers are characterized by needle-like mouth parts which suck the juices of plants. They are carriers of virus diseases from plant to plant. As they feed, they exude "honeydew", a sweet, surplus sap that attracts ants, and bees. These factors did not present the real difficulty, however.

Female leafhoppers lay eggs in stems and leaves. This is where the real damage is done. A bubble-like streak can be noticed on the under side of the leaf. The eggs are contained within. The egg deposits should be gently scraped from the leaf when first noticed. These deposits were noticed on such amaryllids as *Clivia nobilis, Haemanthus puniceus,* and *Hymenocallis speciosa*. However, the plant most severely affected was *Neomarica gracilis* (Iridaceae). On the latter plant, the egg cases would frequently penetrate both sides of the thin leaves. In the thicker leaved amaryllids, only the outer surface of the leaf was generally affected. Deposits on the amaryllids were few as compared to the *Neomarica.*

Favorite host plants of the leafhoppers were species of *Yucca, Cordyline,* and *Agave* (all members of the Agavaceae). Large colonies would form on these plants, and the presence of honeydew was obvious. Egg cases were seen on the under side of the leaves. Damage to these plants was not significant.

Insecticides recommended for leafhoppers are *Malathion, Diazinon,* and *Parathion,* among others. The problem is that the damage (egg cases in the case of amaryllids) has already been done by the time the insecticide is applied. New egg cases appeared over night. Insecticides were not used on the host plants.

Adults hibernate and emerge in the spring in certain areas. They

Bennett—LEAFHOPPERS ON AMARYLLIS, continued on page 59.

PLANT LIFE

VOLUME 34

[Nos. 2-4, incl., Apr., Jul. & Oct.]

1978

GENERAL EDITION

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POLIANTHES HYBRIDS

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Last year I was pleased to announce that a new form of *Polianthes* x *Blissii* had been duplicated by Luther A. Bundrant of Poteet, Texas. The experiment was made to combine both color and fragrance in hybrids with characteristics of the tuberose. This year I am again pleased to announce another new hybrid, *P.* x *Bundrantii* (*P. tuberosa* x *P. howardii*) which is similar to tuberose, save that the flowers have maroon interiors and rose-pink exteriors tipped green (Fig. 23). The fragrance is there, particularly at night, but it is subtle. We knew it would be a longshot to obtain fragrance in a highly colored polychromatic plant like *P. howardii* with its blackish interior and green-red-yellow exterior. One automatically does not expect fragrance to be combined with such a mosaic of gaudy colors. It is to the tuberose's credit that its powerful fragrance can still exist even in its highly colored hybrid offspring.

Polianthes howardii Verhoek-Williams is a new species, discovered in 1972 and published in 1977. It is endemic to a small mountain range in the state of Colima, Mexico. It has had instant success as a garden plant by the few who have seen it and grown it. The flowers are a gaudy combination of green-tipped tubes with a red and yellow exterior and a maroon-black interior. They are scentless, but they may have up to 50 flowers on 3-4 foot stems, and they last well. Unlike most other *Polianthes* which have the flowers in pairs along the stem, those of *P. howardii* are produced singley at each node. One might think that *P. howardii* would be difficult to improve upon, but that is exactly what Mr. Bundrant has attempted to do when he crossed it with *P. tuberosa.* The new hybrids, I have named the hybrid, *P.* x *bundrantii,* in honor of its originator. The flowers resemble the tuberoses in form, pairing at the nodes, but have milder fragrance. They have a maroon interior and green-tipped pinkish exterior like the other parent. It is self fertile, just like its relative *P. x blissii*-Worsley. The next step is to see if the two new hybrids will cross with one another in order to recombine the genes for color with the tuberose genes.

Other *P. tuberosa* x *Polianthes* species seedlings are in the offing. There are two new *Polianthes* species, each with an orange red exterior and yellow interior, and Mr. Bundrant now has what we hope to be hybrids with these and *P. tuberosa.* In addition, a pinkish-white fragrant species from Jalisco has been crossed with *P. tuberosa,* and prospects here seem to be good too.

Mrs. Susan Verhoek has experimentally crossed *P. tuberosa* with *Manfred virginica* and obtained tuberose-like plants with some of the spotting of the *Manfreda* parent in the foliage. Flowers were fragrant (both parents are fragrant) and greenish, like *Manfreda.* Since *M. virginica* is hardy in the lower half of the USA, presumeably these "Manfredanthes" hybrids are at least partly hardy. I have no idea

if they are self fertile, but if they should be, then there is reason to hope that they might intercross with Mr. Bundrants hybrids. Most flowers in the genus *Manfreda* are greenish or brownish, but at least two species have pinkish flowers. Some *Manfreda* species are fragrant, some are odordess, and a few have a medicinal odor. The Manfredas of the south-

Fig. 23. **Polianthes x bundrantii** T. M. Howard, **hybr. nov.**

eastern United States and Texas are at least partly hardy to Oklahoma, Tennessee and Virginia. Both *M. longiflora* (syn. *Runyonia longiflora*) of South Texas and Northern Mexico, and *M. maculosa* of south Texas, are both colorful (pinkish flowers) and delightfully fragrant. *M. virginica,* though not colorful, is delightfully fragrant. *M. brunnea* of Chihuahua in Mexico, is likewise fragrant. *M. potosina* from San Luis

Potosi, Mexico is like a miniature form of *M. virginica*. All of these might be useful in crosses with *Polianthes*. There are many other Mexican *Manfreda* species that might likewise be of interest in a breeding program. We prefer these that are showy, hardy, and fragrant. *M. variegata*, from the lower Rio Grande borders of Texas likewise is of interest, though the flowers have a medicinal odor, like some old cough syrups.

In closing, the writer might mention the existence of self-fertile tuberose clones. I had never noticed it before until the last ten years or so. Then I began to be aware that my tuberoses, obtained locally, were setting seed with some frequency. Eventually I saved seed and gave it to Luther Bundrant to grow to maturity, which he did this year. Ordinarily seed-setting is no phenomenon, but with tuberose, it seems to be. They have been in cultivation for over 400 years. No wild plants are known or have been found by modern man. The origin is said to be Mexico, but this has never been proved, though all the other *Polianthes* species have been found there. It is possible that *P. tuberosa*, like wild corn, simply does not exist in the wilds any longer. The highly civilized Indians of Mexico and Central American Aztecs, Mayans, etc., undoubtedly had use for cut flowers in their markets, just as they do today, and tuberoses no doubt played an important part in this. The Aztec hierarchy loved flowers as well as anyone, and used them in their festivities. No doubt Indian women gathered tuberose bulbs and grew them with other ornamentals alongside their corn fields. If *P. tuberosa* was as endemic as other *Polianthes* species, it would not take long for them to disappear as a wild flower, but as they are so easy to cultivate, it was only natural that they remain as garden plants. Aside from our new F-1 seedlings, only 2 or 3 tuberose clones are currently being cultivated here—a single flowering one and a double flowering one. A single flowered variegated-leaf clone has been offered in the past, but I have not seen it listed in a couple of decades.

POLIANTHES X BUNDRANTII T. M. HOWARD, **SP. NOV.** Fig. 23

Planta hybrida P. tuberosam ♀ et *P.* howardii ♂ intermedia, inflorescentia hanc *P.* tuberosae simulanti, flore intus marronina apicem versus viridi extus subrosea differt. Typus: TRA No. 1173, Aug. 15, cult. San Antonio, Texas.

Description.—*P. tuberosa* L. ♀ x *P. howardii* Verhoek-Williams ♂.

Bulb: oblong, 8 cm long and 3.2 wide. lt. brown outer coats darker near base with fleshy roots; *Lvs.:* 12 in number in rosette, linear, 1.5-2 cm wide, 41-55 cm long, channeled, acute, margins entire, slightly succulent. Meadow-green, undersides dotted maroon on lower ¼-½ length. *Stem* lvs become progressively smaller as they ascend; *Scape:* a raceme, 14.3 dm. tall, meadow green with upper part glaucous; stem base 8 mm diameter.

Floral bracts: one per node, lowest 3.7 cm long becoming smaller as they ascend. Lower bracts meadow green, upper bract lighter in color. *Flowers:* 53 in number, normally paired, but sometime lowest

flowers may be single, sometimes quadrupled in lowest 2-4 nodes, paired thereafter, tubular, flared at tips, slightly fragrant, especially after sunset.

Pedicles: 3 mm to 2.8 cm, longest at lower part of stem; Ovary: 0.9 cm long 3 mm wide, meadow green; *Tepaltube:* slightly curved, tilted 45° above horizontal, 3 cm long, 3 mm wide, at base widening to 8 mm at top, outer surface colored rose-pink, inner surface ivory; *Flower face* 1.7 cm wide, outer three segs 1 cm long, inner three segs 0.8 cm long, 4-5 cm wide. Outer three segs pale green on exterior surface, inner three segs pale green with pink stippling on exterior surface. Inner surfaces of segs ivory, heavily stippled maroon, with ivory keels and margins. *Anthers* cluster at upper surface of tube just below base of segs. *Filaments* 1.1 cm long, attached to tube 1.2 cm above ovary. Style white with maroon stippling near stigma. *Stigma* tri-lobed at maturity and extending beyond tube. Fls. are radially set about the stem with up to 53 fls at maturity. *Fruit:* an oblong capsule, 1.3 cm wide and 1.9 cm long, plus a beak of 5 mm long, Green, becoming lighter at maturity.

Notes: (by Luther Bundrant). In August and September of 1974, the pollen of *P. howardii* was applied to flowers of *P. tuberosa.* Four pods matured, yielding 89 seeds. These were planted in May the follow-year. They began germinating in 9 days and by the 13th day half of them had germinated. The following November, 43 seedlings were growing year. They began germinating in 9 days and by the 13th day half of sand peat moss, and oak leaf mold. These grew vigorously until water was with-held in November to force dormancy. Seven plants refused to go dormant and retained their leaves in spite of dry conditions. When weather began to warm in February, 1977, one of the seven began putting up a scape. Water was applied in late February to stimulate growth.

These first flowers in early March were disappointing, though of interest. The scape had pushed forward from a dry bulb, much too early (and too cold) in the season when temperatures ranged from 40-60 degrees F. This first effort was a bit stunted, much too pale in color, with the flowers smaller than normal. Later flowering efforts from these seedlings reassured us that we had an exciting new hybrid cross. There are some minor variations from one clone to the other, but the clone chosen to represent the cross and discribed here is typical and very representative of the clones that have flowered so far.

It is interesting to note that this cross is the second cross involving *P. tuberosa* with another member of the colored polianthes that the breeder has made and that both hybrid crosses are self fertile. (The first was a repeat of *P. blissii* in PLANT LIFE 1977). Also of interest is that the new hybrid here described is the first recorded hybrid with *P. tuberesa* as the seed parent, and may be the first documentation of *P. tuberosa* having produced seed.

NEW PLANT AND MYCOLOGICAL (MYCOTAE) TAXA

Phylum *Euglenmycota* Traub, *nom. nov.,* Subkingdom Mycotae, Plant Life *33:* 92. 1977 Syn.—Phylum *Euglenophyta,* Subkingdom *Plantae,* Plant Life *33:* 92, 1977.

Phylum *Hydrotophyta* Traub, *phylum (division) nov.,* Subkingdom *Plantae* (Plant Life *33:* 92.1977, *anglise*).

Phylum in Regno Eucaryotae Subregno Plantae Saprolegniales Albugoque Peronosporaceaeque comprehendis, plantis parietibus cellularum celloiosis, sporas flagellatas vel biflagellatas productis, et via lysina acida a-E-diamiinopimelica (DAP) exhibitentis. Typus: Order: *Saprolegniales.*

Phylum *Hydrotophyta* (Gr. *hydor,* water, *-otos,* mold-like, *-phyticos,* plants), Water Mold-like Plants, *Achlya bisexualis, Sapromyces elongatus, Sirolpidium zoophthorum, Phythium, ultimum, Hydrochytrium catentoides, Saprolegniales. Leptomitales, Peronosporales* and *Hyphochytriales,* have been transferred to Subkingdom *Plantae* with the DAP lysine path.—*Hamilton P. Traub*

STUDIES IN THE ALLIEAE II

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ABSTRACT

New South American species, namely **Tristagma peregrinans, Nothoscordum boliviense, N. capivarinum, N. exile, N. goianum, Gilliesia curicana,** and **Speea triloba,** are described **Allium subbiflorum** Bert. et Colla is transferred to **Tristagma.** A study of living material of **Steinmannia graminifolia** Phil., from the type-locality, disclosed that actually the species fits in **Tristagma.** The chromosome number for **Tristagma graninifolia** (Phil.) Rav. is reported as 2n=8. The **Nothoscordum** species are grouped into four subgenera, to wit, **Monanthoscordum,** Rav., **Enoscordum** Rav., **Nothoscordum,** and **Platyscordum** Rav. Additionally, three subspecies are recognized within the **N. inodorum** complex: ssp. **inodorum,** ssp. **angustius** Rav., and ssp. **nocturnum** Rav. Studies in the Tribe **Gilliesieae:** The genus **Chrysocoryne** Zoelln., recently described, is revealed as a synonym of **Leucocoryne** Lindl. In connection with this appraisal, **Stemmatium** Phil., is reduced to a subgenus of **Leucocoryne.** The last revisional note refers to the impossisbility of maintaining the genera **Gethyum** Phil, and **Ancrumia** Harv., as distinct from **Solaria** Phil. Consequently, **Gethyum atropurpureum** Phil., and **Ancrumia cuspidata** Harv., are transferred to the latter genus.

I. NOTES ON TRISTAGMA

1. A NEW **TRISTAGMA** SPECIES FROM URUGUAY

During explorations in north Uruguay in search of *Amaryllis canterae,* a new *Tristagma* species was discovered. This was found near

* Part I of this series appeared in Mus. Nac. Hist. Nat., Notic. Mens. 200: 3-5, Santiago (Chile) 1973; and was translated into English in PLANT LIFE 31: 52-55 1975.

the top of a branch of the Cuchilla Negra, about 8 km W-NW of Tranqueras.

Tristagma peregrinans Rav., **sp. nov.** Fig. 24

A *T. uniflorum* affinis sed habitu graciliore bulbo stolonifero folia angustiora retro-circinata recedit.

Planta usque 9-11 cm alta, Bulbus anguste ovatus extus tunicis cinereo-ochraceis vestitus ad 9-11 cm longus circ. 4-5 mm latus a caudice basali latiusculo stolones albicantes bracteatos emitens. Folia saepe quattuor linearia erecto-patentia deinde retro-circinata vel late spiralata ad 6-9 cm longa circ. 2-2.8 mm lata cinereo-viridia. Scapus debilis ad 6-7 cm longus circ. 1.2 mm latus. Spatha complanata univalvata ad apicem breviter bifida albida vel purpurescens ad 15 mm longa. Inflorescentia uniflora. Pedicellus spathae exsertus ad 19 mm longus. Flos pulchre coeruleus ad 8-9 mm longus circ. 20-24 mm latus. Tepala in tubo circ. 8-8.8 mm connata deinde patentissima lanceolata extus stria fusco-ochracea notata, exteriora circ. 3.5-3.8 mm longa acuta, interiora subaequalia. Filamenta lineari subulata in facie interiori tubi inserta, petalina sepalinum subaequilonga necnon valde supra sepalinos in tubo tepalorum affixa. Antherae subaellypticae circ. 1.1-1.3 mm longae luteae. Ovarium obovatum. Stylus filiformis albus circ. 6-6.5 mm longus a tubo tepalorum breviter exsertus. Stigma capitatus

Plant up to 10-11 cm high. *Bulb* narrowly ovate, 10-11 mm long, 4-5 mm wide, the outer tunics ashy-brown, the basal plate producing whitish, bracteate stolons. *Leaves* often four, linear, at first ascending then recurved or widely spiralled, ash-green, up to 6-9 cm long, 2-2.8 mm broad. *Scape* weak, up to 6-7 cm long, 1.2 mm broad. *Spathe* compressed, univalved, shortly bifid at the apex, up to 15 mm long. *Inflorescence* one-flowered. *Pedicel* exserted, 19 mm long. Flower cobalt-blue, 8-9 mm long, 20-24 mm in diam. *Tepals* joined in a tube for 8-8.8 mm, then spreading, lanceolate, with a purplish-brown streak on the outer face, the outer 12-13 mm long, 3.5-3.8 mm broad, the inner subequal. *Filaments* linear subulate, attached to the inner surface of the tube, the epipetal as long as the episepal, but inserted at a different level above the episepal series. *Anthers* subelliptical, 1.1-1.3 mm long, yellow. *Ovary* subovoid. *Style* filiform, 6-6.5 mm long, shortly exserted from the tepaltube. *Stigma* capitate.

Habitat.—Upper slopes of a branch of the Cuchilla Negra, 8 km W-NW of Tranqueras, in north Uruguay. The plants were growing among stones in a dark soil, near *Cypella Herbertii* (Lindl.) Herb. ssp. (Irid.) .

Specimens: In decliviis superioribus bifurcatio australi Cuchilla-Negrae 8 km ad occidentem vel septentrioni-occidentem Tranqueras Uruguariae; leg. Ravenna 541, VIII-1966 (typus in Herb. Ravennae.

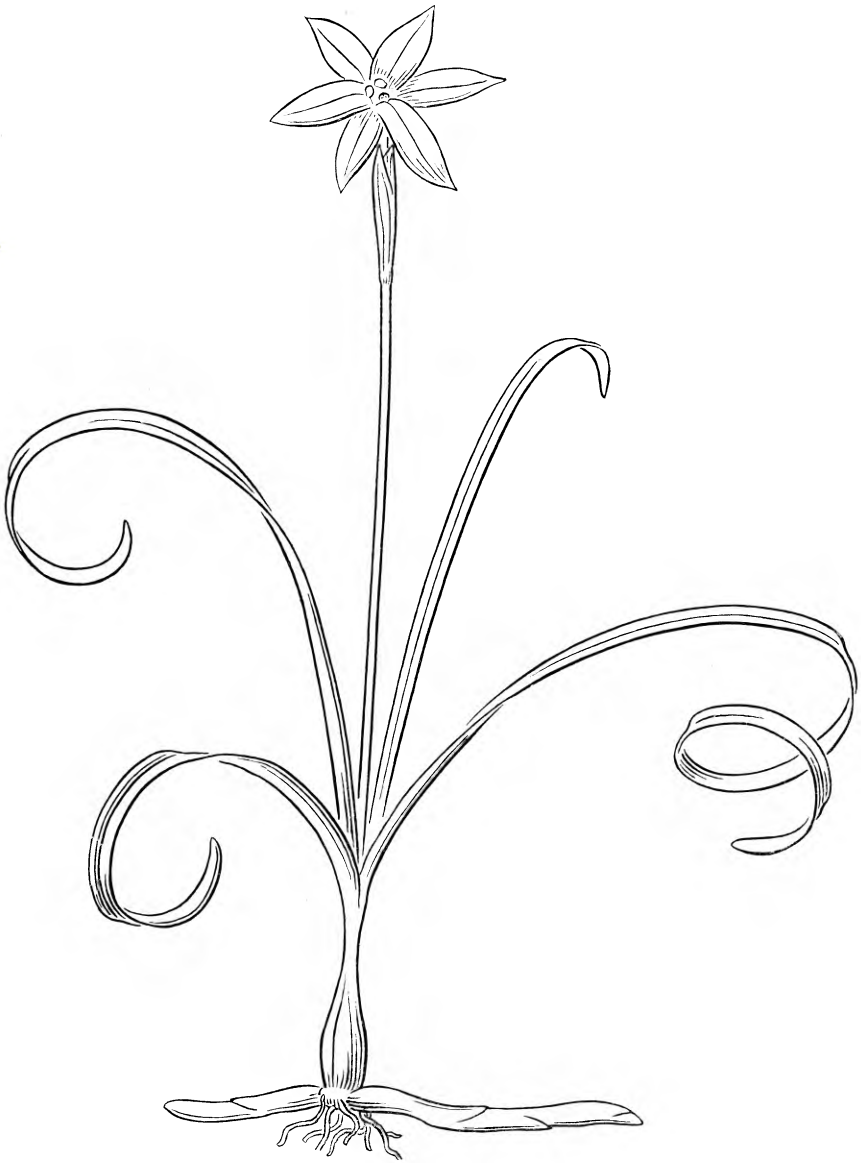

Fig. 24. **Tristagma peregrinans** Rav. **sp. nov.,** general view of the plant. Ravenna del. Flower cobalt blue.

isotypi institutionibus patet).

T. peregrinans is remarkable in being the only species of the genus that produces stolons from the basal plate. This feature is also found, as unusual, in a form of *Nothoscordum bonariense.*

The species is allied to *T. uniflorum,* differing in the mentioned character, the more slender, recurved, or backward spiralled leaves, and smaller flowers.

2. **STEINMANNIA GRAMINIFOLIA** PHIL. REFERRED TO GENUS **TRISTAGMA**

Tristagma graminifolium (Phil.) **comb. nov.** Fig. 25

Steinmannia graminifolia Philippi, Anal. Univ. Chile 65: 64, 1884.- *Garaventa graminifolia* (Phil.) Looser, Rev. Chil. Hist. Nat. (1944): 77, 1945.- *Nothoscordum graminifolium* (Phil.) Traub, Pl. Life 24: 49, 1968.

Since a number of years, I have examined in its wild state the species known as *Steinmannia graminifolia* Phil., or *Garaventia graminifolia* (Phil.) Loos. (the former genus-name was illegitimate). Experimental culture was attempted, but plants were lost after one or two seasons.

The arrangement of leaves, and the flower characters, including the perigone shape, fit in *Tristagma.* Although smaller in all its parts, the plant rather resembles *T. brevipes,* an Andean species which also has a tubular perigone.

Root-tips were pretreated, and squashed by means of the usual technique described elsewhere (Ravenna 1967). The species revealed a chromosome complement of $2n = 8$. This same number I found in several Chilean species of *Tristagma,* and was reported by Del Pozo (1974) in *T. nivale.* Unfortunately, well scattered chromosomes for illustration were not obtained.

The report of $2n = 22$ chromosomes in *Brodiaea porrifolia* (= *Tristagma bivalve*) by Sáez (1965), was probably based on some misidentified material.

The peduncle of *T. graminifolia* is, when in flower, moderately well developed. However, its growth continuates from the base after the flower has faded. When the capsule is formed, the peduncle appears as deflexed, or strongly recurved, as it is in the *humifuse* fruits of several eastern *Tristagma* species. The plants grow wedged among large rocks where rich, although scarce soil is available. Hence the fruit cannot be defined as *humifuse,* since it is suspended on the deflexed peduncle; but the growing process of the latter is the same, as explained above.

Plant up to 4-8 cm high. *Bulb* ovoid, often compressed by pressure of rocks, ca. 10-13 mm long, 7-9 mm wide; outer coats whitish or seldom brownish, prolonged for 15-43 mm into a pseudo-neck. *Leaves* narrowly linear, very slightly channelled, green, rather flaccid, smooth, 4-7 at anthesis, almost always spreading or prostrate, to 30-85 mm long, 1-1.4 mm broad. *Scape* subfiliform, erect or sometimes deflexed, brownish-green, slightly striate, 25-29 mm long, strongly deflexed when in

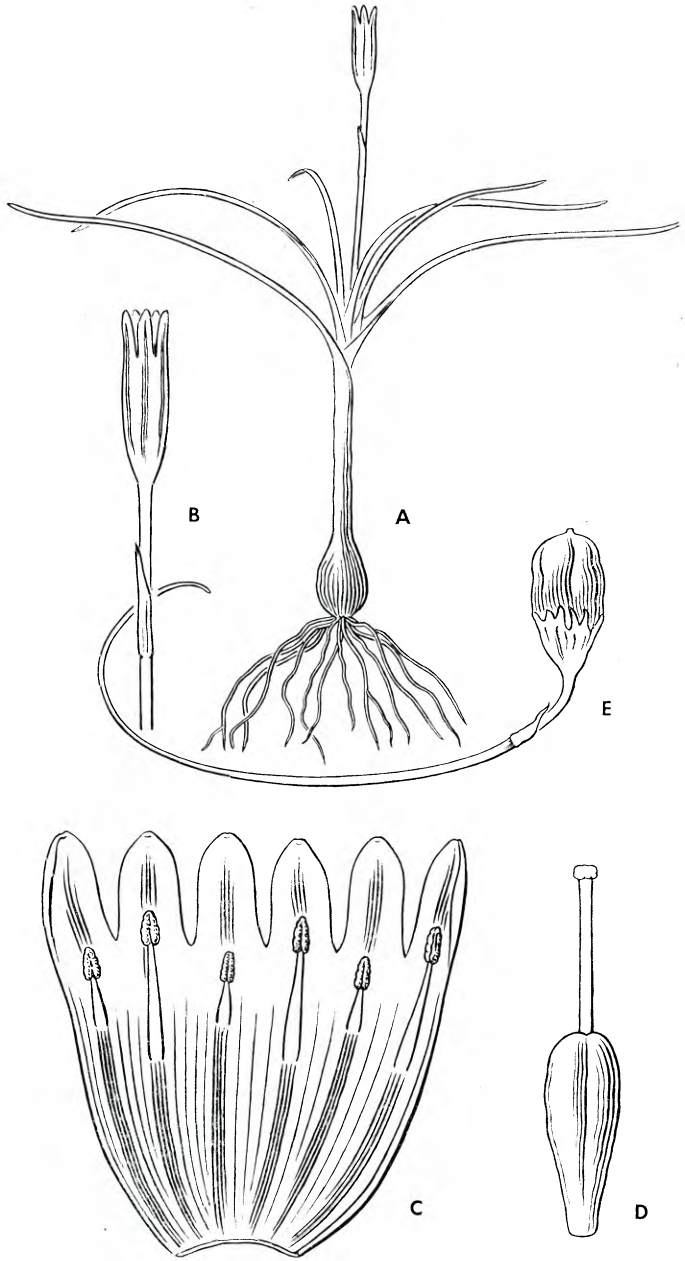

Fig. 25. **Tristagma graminifolium** (Phil.) Rav.; **A,** plant; **B.** spathe with flower; **C,** internal view of perigone showing stamens; **D,** gynoecium; **E,** aspect of scape in fruit, and capsule. P. Ravenna del.

fruit. *Spathe* one-valved or sometimes bivalved, the outer valve with its margins joined below for 2 mm, whitish-hyline, membranous, delicate, the upper part entire, 2 mm long. *Pedicel* ca. 4.8-12 mm long. *Perigone* greenish-white with six dark-purple streaks reaching the apex of segments, narrowly infundibulate to tubular, 6-6.5 mm long, 5 mm in diam. *Tepals* connate in a tube for 5.4 mm, free portion ca. 2.4-2.5 mm long, greenish inside and marked with a brownish-purple streak; the outer with an obtuse pennicilled tubercle at the apex. *Filaments* linear-lanceolate or linear-attenuate, flattened; the episepal series 2.25-2.5 mm long, attached at 3-4 mm from the base of the tube; the epipetal 0.8-0.9 mm long, attached at 4.3 mm from the base of the tube. *Anthers* ovate, light yellow, erect or subversatile, 0.7 mm long. *Ovary* obpyriform green, to 3.7 mm long, 1.3 mm wide. *Style* filiform, whitish, up to 2.7 mm long. *Stigma* capitate, sometimes subtrilobed. *Capsule* almost ellipsoid, to 6 mm long, green.

Looser (1945), reports the species for the eastern slope of the Cerro de la Virgen, in the vicinity of the town of Los Andes, province of Aconcagua.

Guaglianone (1972, p. 169), states that "the pedicels incurve geothropically after the anthesis, in such manner that the capsule is pendulous, and the scape remains erect." Her appraisal, however, relied on some dry specimens at the Museum of Santiago, where the scape was pressed in an unproper position.

Specimens: Chile, prov. Santiago, Cerro Renca; leg. F. Philippi, Aug. 1883 (SGO 46837, type, SGO 46836, isotype). Idem ibid.; leg. M. Espinosa, 7-IX-1935 (SGO 76090, 76091 & 76092). Idem ibid.; leg. C. Grandjot, 15-IX-1933 (SGO 64649). Idem ibid, entre las fisuras de las rocas del primer gran farellón; leg. C. Muñoz et al., 10-IX-1966, seeds (SGO 77013). Idem ibid.; leg. C. Muñoz et al., 15-VII-1974 (SGO 691337). Idem, Cerro San Ignacio; leg. Gertrud Grandjot, (Herb. Rav., Herb Gunckel at Santiago). Culta in Santiago ex bulbis ad Cerro Renca collectis; leg. Ravenna s/n, VII-1975 (Herb. Rav.).

3. AN ADDITIONAL CHILEAN SPECIES OF GENUS **TRISTAGMA**

Tristagma subbiflora (Bert. et Colla) **comb. nov.**

Allium subbiflorum Bertero et Colla, Pl. Rar. 7: 13, 1836.-*Triteleia berteri* Kunth, Enum. Pl. 4: 467, 1843.-*Nothoscordum subbiflorum* (Bert. et Colla) Walpers, Ann. Bot. Syst 3: 636, 18.-*Brodiaea subbiflora* (Bert. et Colla) Baker, Gard. Chron. 1896, 2: 459.

Tristagma subbiflora appears to be closely related to *T. bivalve* (Lindl.) Tr., differing in the smaller size of the whole plant, and the very narrow (1-1.5 mm), opaque leaves. The inflorescence is 1-3-flowered.

II. STUDIES IN THE GENUS NOTHOSCORDUM

1. NEW SPECIES FROM ARGENTINA, BOLIVIA, AND BRAZIL

Nothoscordum boliviense Rav., **sp. nov**. Fig. 26 (Subgen. Platyscordum)

Planta usque 30-45 cm alta. Bulbus oblongo-ovatus ebulbilliferus ad basin perfragilis ad 18-29 mm longus circ. 7.5-12 mm latus in pseudocollo circ. 20-35 mm productus. Folia oblique patentia vel ascendentia ad 15-45 cm longa circ. 1-2 mm lata. Inflorescentia 5-9-flora. Pedicelli floriferi erecti vel erecto-patentes virides circ. 10-22 mm longi. Flores albi praeter basin pallide viridem ad 10-19 mm lata. Tepala lanceolata ad 8-10 mm longa circ. 2.8-4 mm lata. Filamenta lanceolato-attenuata, sepalina 4.5-5 mm longa, petalina subaequilonga necnon ad 0.6 mm ultra sepalina affixa. Antherae post dehiscentiam circ. 1-1.3 mm longae; pollen aurantiacus. Ovarium truncato-aellypticum ad 3.9 mm longum circ. 1.6 mm latum. Stylus filiformis albus vel albicans ad 5.9 mm longus. Stigma distincte capitatus.

Plant up to 30-45 cm high. *Bulb* not carrying bulblets, ovoid-oblong, very fragile below, 18-29 mm long, 7.5-12 mm broad, prolonged into a 7.5-12 mm long pseudoneck; outer coats blackish; basal plate oblique, rather wide or at least distinct. *Leaves* few, linnear channelled, bright-green or sometimes almost ash-green and pruinose, subcarinate, striate on the back, up to 15-45 cm long, 1-2 mm broad. *Scape* pale green, almost as long as the leaves, 1.5 mm broad. *Inflorescence* 5-9-flowered. *Flowering pedicels* ascending, pale green, 10-22 mm long. *Flowers* white, pale green below, up to 13-19 mm in diameter. *Tepals* lanceolate, white, without any streak, up to 10 mm long, the outer 2.8-4 mm long, the inner acute, 2.7-3.9 mm broad. *Filaments* lanceolate-attenuate, pale green in the lower half, white upwards, up to 5 mm long, the epipetal series inserted 0.6 mm beyond the episepal series. *Anthers* obliquely versatile, reniform-oblong after dehiscence, 1.3 mm long; *pollen* orange. *Ovary* irregularly ellipsoid-truncate, green, 3.9 mm long, 1.6 mm wide. *Style* filiform, white or whitish. *Stigma* distinctly capitate, *Chromosomes*, $2n = 10$.

Habitat.—Hills and uplands of the Department of Cochabamba, Bolivia, also in North Argentina, in the provinces of Tucumán and Jujuy. In Bolivia, it has been collected on slopes at the Chaguarani gulch, where it grows in a sandy, reddish clay, near *Mastigostyla gracilis* Fost. (Irid.), *Oxalis* sp., *Junellia* sp. (Verbenaceae), and among bushes of *Flourensia* sp. (Compositae), and Malpighiaceae, at an altitude of 2600 m above the sea. It was also seen near Apillapa (region of Anzaldo), on a dark, clayish soil, at 3500 m of altitude.

Specimens: In collibus prope Chaguarani prov. Mizque civit Cochabamba Boliviae; leg. Ravenna 2131, II-1976 (typus in Herbario Ravennae, isotypi TRA, SI). Argentina, prov. of Tucumán, Valle del Tafí; leg. C. Bruch, 1908 (LP 20421). Idem, Estancia Las Pavas, 3000 m; leg. Venturi 4667, 27-XI-1926 (LP, LIL). Prov. of Jujuy, Lagunas de Yala; leg. Cabrera et al. 21278, 12/14-II-1971 (LP). Idem,

Fig. 26. **Nothoscordum boliviense** Rav., upper and side view of inflorescence. Photo P. Ravenna

dept. Yaví, Abra de La Quiaca, on the way to Santa Catalina; leg. Cabrera et al. 17610, 20-I-1966 (LP). Idem, Peña Blanca; leg. H. Tello 27, 16-I-1963 (LP). Idem, dept. Santa Bárbara, Sierra de Santa Bárbara, 2300 m; leg. E. De la Sota 2947, 13-XII-1962 (LP).

A remarkable species because of its narrow, subcarinate, striate, narrowly channelled leaves, and comparatively large, funnel-shaped flowers. In a population from near Apillapa, the outer-tepals were tinged purple on the outer face.

Nothoscordum boliviense is related with *N. arenarium* Hert. Although it is rather difficult to distinguish both species in the dry state, the species is readily separate, in its living state, by means of the leaf morphology. *N. arenarium* has less fragile, slightly channelled, smooth, dark-green leaves. Both species reveal a somatic chomosomes complement of $2n = 10$.

Nothoscordum capivarinum Rav., **sp. nov.** Fig. 27 (Subgen. Nothoscordum)

Species a *Nothoscordo bonariensi* et *nublensi* simile sed foliis late linearibus saepe subplanis ad margines minutissime ciliolatis floribus in omne partibus gracilioribus filamentis albis recedit.

Planta usque 15-20 cm alta. Bulbus ovatus perbulbilliferus albiusculus vel tunicis exterioribus fusco-ochraceis. Folia ad anthesin circiter sex fusco-viridia nitida ad margines saepe minutissime ciliolata vel glabrescentia ad 14-30 cm longa circ. 4.5-9.5 mm lata ad apicem obtusa vel subacuta. Inflorescentia 4-6 flora. Pedicelli graciles ad 14-30 mm longi. Flos albus inferne viridescens leviter fragrans vel inodorus usque 14 mm latus. Tepala lanceolata inferne circ. 1.9 mm connata deinde 6 mm longa, exteriora circ. 3 mm lata interdum stria viridia vel purpurea extus notata, interiora 2.9 mm lata subacuta basin versus saepe stria tenuis viridi extus notata. Filamenta filiformi-subulata alba, sepalina 3.5 mm longa, petalina 3.4 mm longa. Antherae oblongae post dehiscentiam versatiles saepe tortiles ad 1.8-1.9 mm longae. Ovarium late obovatum pallide viride nitidum ad 1.6 mm longum circ. 1.4 mm latum. Stylus teres albus ad 2.7-3.6 mm longus circ. 0.47 mm latus. Stigma simplex subcapitatus. Capsule parva subgloboso-tricocca pauciseminata fusco-viridia. Semina in loculo dua vel unicum subaellyptica vel (si dua in loculo) valde angulata laevia nigra nitentia ad 2.7-2.8 mm longa.

Plant up to 15-20 cm high. *Bulb* ovoid very prolific of bulblets, whitish or covered by thin brownish coats, 18-25 mm long, 8.5-11 mm broad. *Leaves* about six, dark green, with minutely ciliolate margins, or sometimes glabrescent, up to 14-30 cm long, *4.5-8(-9) mm broad*, obtuse or subacute. *Scape* weak, green, 8-17 cm long. *Spathe-valves* marcescent, joined for 2.5-6 mm below, then 10-12 mm long. *Inflorescence* 4-6(-8)-flowered. *Pedicels* weak, green, sometimes laxly recurved before the anthesis, floriferous 14-30 mm long, fructiferous slightly longer. *Flowers* white, greenish at the base, slightly *fragrant* or scentless, 12-14 mm in diameter. *Tepals* lanceolate, joined for 1.9 mm below, then 5-6 mm long, the outer acute, 3 mm broad, sometimes with a green

or purplish streak on the outer face, the inner subacute, 2.9 mm broad, sometimes with a greenish streak on the outer face below. *Filaments* filiform-subulate or filiform-attenuate, weak, white, episepal 3.5 mm long, epipetal 3.4 mm long. *Anthers* oblong, versatile, often twisted, 1.8-1.9 mm long. *Ovary* widely obovate, pale green, shining, 1.6 mm long, 1.4 mm wide. *Style* narrowly cylindrical, white, 2.7-3.6 mm long,

Fig. 27. Nothoscordum capivarium Rav., **sp. nov.,** infloresence. Photo P. Ravenna

0.47 mm broad. *Stigma* subcapitate. *Capsule* almost globost-tricoccous, small, 3-4.5 mm in diam., few-seeded, a dark, shining green. Seeds two or single in each cell, subellipsoid or, when they are two in the cell, angulate, black, shining, smooth, 2.7-2.8 mm long.

Habitat.—Among small rocks near the banks of the Capivarí river, at Sesmarías, State of Paraná, Brazil. It grows in sandy soil, closely

associated with *Zephyranthes capivarina* Rav.

Specimens: Culta in Bonaria ex bulbis ad ripas fluminis Capivarí pr. Sesmarías civit. Paraná Brasiliae collectis; leg. Ravenna 1095, XII-1969 typus in Herbario Ravenna, isotypi NY, TRA, K, U, SI, R. RB). Culta in Santiago ex bulbis in eidem locis collectis; leg. ipse 2210, XI-1976 (Herb. Rav.) Brazil, mun. Chopinzinho, Rio Iguazú, Salto Santiago; leg. Hatschbach 36634, 11-IV-1975 (Herb. Rav., Herb. Hatschbach).

This striking species bears the broadest leaves in the subgenus *Nothoscordum.* It rather resembles both *N. bonariense* and *N. nublense,* differing in the often minutely ciliolate, broader leaves, slender parts of the flower, and smaller fruits with one or two seeds per cell. It thrives better under partial shade.

Nothoscordum exile Rav., **sp. nov.** (Subgen. Nothoscordum)

A caeteris speciebus floribus perminutis stylo ovarii breviore latiusculo recedit.

Planta usque 16-35 cm alta. Bulbus subglobosus ad 6-9 mm latus in collo circ. 13-50 mm longo productus. Folia lineari-filiformia circ. 3-4 usque 12-22 cm longa circ. 0.5-1 mm lata. Scapus gracilis ad 16-31 cm longus. Inflorescentia 7-10-flora. Pedicelli erecto-patentes ad 20-57 mm longi. Flores late infundibulati albi in vivo 2 mm longi circ. 4 mm lati. Tepala lanceolata ad basin usque 0.5 mm connata deinde usque 4 mm longa extus stria purpurea notata, exteriora 1.3 mm lata, interiora 1.4 mm lata. Filamenta la ceolato-attenuata alba circ, ad 0.5-0.6 mm e basin tepalorum tubi affixa, sepalina 1.7 mm longa, petalina 2-2.1 mm longa. Antherae luteae pre-dehiscentiam ovato-lanceolatae ad 1 mm longae post-dehiscentiam 0.7 mm longae. Ovarium aellypticum viride usque 1.5 mm longum circ. 0.9 mm latum. Stylus cylindraceum albus ad 0.8 mm longus. Stigma incrassatus subcapitatus. Capsula globosa ad 2.8-4 mm in diametro. Semina in loculo dua vel unicum ovata nigra circ. 1.4-1.5 mm longa.

Plant up to 16-35 cm high. *Bulb* subglobose, 6-9 mm in diam. prolonged into a 13-50 mm long pseudo-neck. *Leaves* 3-4 at anthesis, linear-filiform, up to 12-22 cm long, 0.5-1 mm broad. *Scape* very slender, 16-31 cm long. *Spathe-valves* membranous, hyaline, lanceolate, ventricose below, joined at the base for 1-2 mm, then 3-4.5 mm long. *Inflorescence* 7-10-flowered. *Pedicels* obliquely ascending, 20-57 mm long. *Flowers* white, 2 mm long when fully expanded, 4 mm in diameter. *Tepals* lanceolate connate in a tube for 0.5 mm, externally with a purple streak, up to 4 mm long, the outer 1.3 mm broad, the inner 1.4 mm broad. *Filaments* lanceolate-attenuate, white, inserted at 0.5-0.6 mm from the base of the tube, the episepal 1.7 mm long, the epipetal 2-2.1 mm long. *Anthers* yellow before dehiscence lanceolate-ovate, 1 mm long, afterwards 0.7 mm long. *Ovary* ellypsoid, green, up to 1.5 mm long, 0.9 mm wide. *Style* cylindric, white, 0.8 mm long. *Stigma* thick, subcapitate. *Capsule* globose, 2.5-2.8 mm in diameter. *Seeds* often 2 per cell, ovate, black, 1.4-1.5 mm long.

Habitat.—It grows in stony fields at Cantagalo, in the municipe of Guarapuava, State of Paraná, Brazil; *Sisyrinchium setaceum Kl.* (Irid.), and *Zephyranthes paranaënsis* Rav. are found in the same environment. Also in the municiple of Palma in the same State, at Morro da Baliza.

Specimens: In lapidosis ad Cantagalo mun. Guarapuava civit Paranaënsis Brasilae; leg. Ravenna 1016 et G. Hatschbach (typus in Herbario Ravennae, isotypi Herb. Hatschbach ad Inst. Munic. Bot Curitibae, NY, TRA, K, SI). Idem, mun. Palma, Morro da Baliza; leg. Hatschbach 30736, 19-XI-1972 (Herb. Rav., Herb. Hatschbach, Curitiba).

Nothoscordum goianum Rav., **sp. nov.** (Subgen. Nothoscordum)

Planta parva circ. 10 cm alta. Folia linearia vel lineari-attenuata ad 10-15 cm longa circ. 1-3.5(-4) mm lata. Spathae valvae lanceolate membranaceae inferne usque 1.5-1.8 mm connatae deinde 9.5-11 mm longae. Inflorescentia 6-8-flora. Pedicelli pergraciles 13-36 mm longi. Flores albicantes infundibulati (in sicco) ad 4-8 mm longi circ. 5-8 mm in diametro. Tepala lanceolata inferne circ. 0.5-0.7 mm concrescentia caeterum 5.5-6 mm longum exteriora 1.5-2 mm lata, interiora parum angustiora. Filamenta linear-attenuata, alba, sepalina 2.8-3.3 mm longa, petalina 3.5-4.2 mm longa. Antherae 0.8-1 mm longae. Ovarium viride ad 1.2-1.8 mm longum circ. 0.7-1 mm latum. Stylus tenuiter filiformis ad 3-3.7 mm longum. Stigma minute capitatus.

Small plants, up to 10 cm high. *Bulb* subglobose, 8-9 mm wide prolonged into a 10-15 mm long pseudo-neck. *Leaves* linear, or linear-attenuate, up to 10-15 cm long (?), 1-3.5(-4) mm broad. *Spathe valves* membranous, lanceolate, joined below for 1.5-1.8 mm, then 9.5-11 mm long. *Inflorescence* 6-8-flowered. *Pedicels* 13-35 mm long. *Flowers* whitish, infundibulate, 4-8 mm long, 5-8 mm in diameter. *Tepals* lanceolate, joined at the base for 0.5-0.7 mm, free portion 5.5-6 mm long, the outer 1.5-1.8 mm broad, the inner slightly narrower. *Filaments* linear-attenuate, white, the episepal 2.8-3.3 mm long, the epipetal 3.5-4.2 mm long. *Anthers* 0.8-1 mm long. *Ovary* 1.2-1.8 mm long, green. *Style* narrowly filiform, up to 3-3.7 mm long, white. *Stigma* minute, capitate.

Habitat.—According to the collector of the material designated as the type, the species grows among calcareous outcrops, about 120 km beyond Formosa, in the State of Goiás, Brazil.

Specimens: Brazil, Goiás, 120 km além de Formosa; leg. E. P. Heringer 10747, 16-X-1965 (type NY, isotype UB?). Brazil; leg. Gardner 3472, 1836-1841 (NY, BM).

The species seems to be closely related to *N. bonariense*, and *N. montevidense*. From the former, it differs in the smaller size of the whole plant, shorter filaments and style. The latter has, at least typically, narrower, almost filiform leaves, and bright yellow flowers.

Gardner 3472 from "Brazil", seems to be the same. The bulb is described from this collection.

2. THE INFRA-GENERIC DIVISIONS OF **NOTHOSCORDUM**

Guaglianone (1972), recognizes two sections in *Nothoscordum* sensu Guagl. These are: *Nothoscordum,* and *Inodorum* Guagl. A further section, *Uniflorum* Beauv., she includes in *Ipheion* Rafin., a genus that she believes to be distinct from *Tristagma* Poepp. Additionally, she changes the name *Uniflorum* Beauv. for *Hirtellum* Guagl., with *Ipheion hirtellum* (Kunth) Traub as the type. The reason of her action is that "it may be confused with the section *Ipheion* to which the true *I. uniflorum* belongs".

Adjectival designations may be used, although in their plural form, for such infra-generic groups as Subsection or Series. It would not be convenient to innovate these in this respect. Actually, the use of adjectival forms for Subgenera or Sections, is disapproved by Art. 20A (f, g) of the Code.

Since *Nothoscordum* shows definite evolutionary trends, that are rather more than mere sections, it seems better to consider them in the subgenus rank.

Nothoscordum Kunth, subgenus **Monanthoscordum** Rav., **subgen. nov.**

A subgenus *Nothoscordum* inflorescentia uniflora pedicello spathae breviore differt. Typus: *N. felipponeii* Beauv.

The group differs from the subgenera *Nothoscordum,* and *Enoscordum* (see below), due to the one-flowered inflorescence, and the pedicel which is much shorter than the spathe.

The following species are also referred to this subgenus: *N. vittatum* (Gris.) Rav., *N. setaceum* (Bak.) Rav., *N. hirtellum* (Kth.) Hert., and *N. dialystemon* (Guagl.) Crosa.

Nothoscordum Kunth, subgenus **Enoscordum** Rav., **subgen. nov.**

A subgeneris *Nothoscordum* et *Monanthoscordum* tunicis tenuibus in vivo albicantibus et sicco vinaceis pedicellis gracillimis recedit. Typus: *N. serenense* Rav. Additional species included: *N. andinum* (Poepp.) Kth.

Crosa (1975) proposed the new genus *Zoellnerallium,* with *N. andinum* as the type, basing his statement merely on the chromosome morphology, and color of the bulb tunics when dry. Both characters, in my opinion, do not justify a new genus.

Nothoscordum Kunth, subgenus **Platyscordum** Rav., **subgen. nov.**

A subgeneribus *Nothoscordum Enoscordum* et *Monanthoscordum* caudice bulbi lato foliis saepissime valde latis pallide viridis pruinosis filamentis crebro latiusculis differt. Typus: *N. inodorum* (Ait.) Nich.

Species included: *N. inodorum* (Ait.) Nich., *N. andicola* Kth., *N. entrerianum* Rav., *N. nudicaule* (Lehm.) Guagl., and *N. arenarium* Hert.

Guaglianone (1972), places *N. arenarium* Hert. in this group; this probably is correct. Nevertheless, she includes, some material from the provinces of Catamarca, Salta, Córdoba, and La Rioja, in the species.

The specimens from Catamarca, at least, represent a new species, *N. andalgalense* Rav., which belongs in subgenus *Nothoscordum*.

Key to the subgenera of **Nothoscordum**

1a. Inflorescence one-flowered. Pedicel, even with fruit, shorter than the spathe. Flower comparatively large ..... Subgen. 1. **Monanthoscordum**
1b. Inflorescence several-flowered, exceptionally one-flowered in **N. montevidense**. Pedicel exceeding the spathe, rarely shorter when with flower (in subgen. Platyscordum), elongating afterwards. Flower comparatively small.
2a. Filaments free to the base.
3a. Bulb tunics turning purple when dry ..... Subgen. 2. **Enoscordum**
3b. Bulb tunics not turning purple when dry ..... Subgen. 3. **Nothoscordum**
2b. Filaments more or less connate at the base, rarely also, irregularly, almost halfway up ..... **Subgen. 4. Platyscordum**

3. THE SUBSPECIES OF **NOTHOSCORDUM INODORUM**

Nothoscordum inodorum (Ait.) Nicholson comprises, so far, three well-defined subspecies. Guaglianone (1972, p. 207 & 208) distinguished two "varieties": var. *inodorum*, and var. *macrostemon* (Kunth). Beauv. She includes var. *gracilis* (Driand ex Ait.) Bak., apparently collected in Jamaica, and subspecies *nocturnum* Rav., under synonymy of the latter. Actually, some of the specimens from Entre Ríos that she cites, belong in the subspecies *angustius*, described subsequently. The var. *macrostemon* (Kth.) Beauv. seems doubtful, at least as far as my knowledge goes.

Nothoscordum inodorum (Ait.) Nich. ssp. **angustius** Rav., **ssp. nov.**

A *Nothoscordo inodoro* subspecibus *inodorum* et *nocturnum* floribus parvis gracillibus saepe unilateralibus cernuis usque 8 mm vel minus longis circ. 7 mm latis extus ochraceo-viridescenti-tincti recedit.

It differs from the subspecies *inodorum* and *nocturnum* in the often unilateral inflorescence, with cernuous slenderer flowers; these are, externally, greenish-brown for much of their length, up to 8 mm long, 7 mm in diameter.

Habitat.—Known, so far, only for the eastern part of the province of Entre Ríos, Argentina, near the town of Concepción del Uruguay, but probably extending farther elsewhere. It was found almost as a "ruderal" near the cultivated fields, and meadows.

Specimens: Culta in Bonaria ex bulbis in praedio experimentali agricola Conceptionis-Uruguariae prov. Entre Ríos Argentinae collectis; leg. Ravenna 970, V-1968 (typus in Herbario Ravennae).

This subspecies opens its flowers in the afternoon, as in subspecies *inodorum*. They both have a more or less "infundibulate" perigone. The flowers of ssp. *nocturnum*, however, expand well only at night; the tepals spread horizontally, giving a wheel-like appearance to the perigone.

N. inodorum var. *uruguayense* Beauv. is at present uncertain, possibly referable to subspecies *angustius* Rav.

N. andicola Kunth is an allied species which differ mainly in its linear leaves. The epithet *andicola* has been considered as incorrect by Guaglianone (loc. cit. p. 199); nevertheless, the neutral form, supposedly "andicolum" does not exist. Although Botany is full of

neutral designations for species, Latin does not contemplate the case of neutral living forms that may inhabit *(colere)* a place. *Hordeum andicola,* and *Cercidium andicola,* are other instances.

KEY TO THE SUBSPECIES OF **NOTHOSCORDUM INODORUM**

1a. Flowers funnel-shaped, when fully expanded in the afternoon.
  2a. Flowers 10-12 mm in diameter, greenish, or greenish-brown only near the base ..... 1. **N. inodorum** ssp. **inodorum**
  2b. Flowers 6-7 mm in diameter, greenish or greenish-brown, outside, for much of their length ..... 2. **N. inodorum** ssp. **angustius**
1b. Flowers wheel-shaped when fully expanded at night .....3. **N. inodorum** ssp. **nocturnum**

NOTHOSCORDUM SUBSPECIES

1. **Nothoscordum montevidense** Beauv. ssp. **latitepalum** (Guagl.) Rav. **stat. nov.**

Northoscordum montevidense Beauv. var. *latitepalum* Guaglianone, Darwiniana 17: 232, 1972.

This subspecies has obovate, instead of lanceolate tepals.

2. **Nothoscordum montevidense** Beauv. ssp. **minarum** (Beauv.) Rav., **stat. nov.**

Nothoscordum minarum Beauverd, Bull. Herb. Boiss, Ser II, 8: 1001, fig. 3, H-M, 1908.- *N. montevidense* Beauv. var. *minarum* (Beauv.) Guaglianone, Darwiniana 17: 232, fig. 27, 1972.

The leaves are broader, and the flowers more numerous in the inflorescence, than in subspecies *montevidense.*

3. **Nothoscordum hirtellum** (Kth.) Hert. ssp. **lorentzii** (Hert.) Rav., **comb. nov.**

Beauverdia lorentzii Herter, Boissiera 7: 509, fig. 54, 1943.-*Ipheion lorentzii* (Hert). Traub, Pl. Life 5: 50, 1949.- *Nothoscordum lorentzii* (Herb.) Ravenna, Pl. Life 23: 50, 1967.- *Nothoscordum felipponeii* Beauv. ssp. *lorentzii* (Hert.) Ravenna, Pl. Life 26: 74, fig. 21, 1969.

After the study of Guaglianone (1972), it seems clear that subspecies *lorentzii* belong here, rather than in *N. felipponeii.* The whole plant, both in this subspecies and the type, emit a repellent alliaceous smell.

The subspecies *hirtellum,* with six tepals and stamens, inhabit exclusively Uruguay. In contrast, subspecies *lorentzii,* which is tetramerous (eight tepals and stamens), is found only in eastern and northeastern Argentina. Both entities are constant in the number of their verticiles.

III. *CHRYSOCORYNE* REDUCED TO *LEUCOCORYNE,* AND THE NATURE OF "STAMINODES"

Gay (1853, p. 126) describes *Tristagma dimorphopetala,* giving lately a figure of it in his Atlas. The species was defined as having an additional whorl of inner-tepals (hence the speciphic epithet), and six stamens on the inner face of the tepaltube. These supernumerary inner-tepals represented an unusual feature in *Tristagma!*

A close examination of the type-material (at SGO) revealed that, although rather flat these "petals" actually are thick, of the same nature as the appendages of *Leucocoryne.* In the latter genus they are

considered as *staminodes*. How then could the existence of six stamens be explained? Seemingly, there is only one explanation: the tissue of the appendages, in the present species, are part of a not fully apparent staminal cup, which became concrescent with the tepaltube. The latter is strictly interpreted as the joined portion of tepals forming a funnel or tube.

Stemmatium narcissoides (Phil.) Phil. is similar in every respect to *Leucocoryne,* except for the existence of six stamens on the inner face of the tepaltube, and six appendages, each corresponding to a stamen. This fact may prove the assumption that the "staminodes" of *Leucocoryne,* and the "additional whorl of inner-tepals", in *Tristagma dimorphopetala,* are part of a staminal-cup. This might also be the case of *Tulbaghia,* a South-African genus allied to *Leucocoryne.*

The bright yellow appendages of *Stemmatium narcissoides* are flat, and rather thick, giving to the flower a daffodil-like appearance. This species was first proposed by Philippi (1860) in *Leucocoryne,* and later reclassified by him, using the same epithet, when describing *Stemmatium* (see Philippi 1873). He probably intended to make a new combination.

Zoellner (1973), proposed *Chrysocoryne,* as a new genus, with *Ch. oxypetala* (Phil.) Zoelln. (*Leucocoryne oxypetala* Phil.) as the type. A second species, *Ch. incrassata* (Phil.) Zoelln (*L. incrassata* Phil.), was also included.

As a matter of fact, *L. oxypetala* (lectotype SGO 46765, from "Copiapó-Pabellón", leg. San Román) is a typical *Leucocoryne,* probably identical with *L. macropetala* Phil. which has the priority. On the other hand, an examination of the type material of *L. incrassata* Phil. (lectotype SGO 46776), basionym of *Ch. incrassata* (Phil.) Zoelln., reveals that this is a synonym of *L. narcissoides* Phil. (1860).

The genus *Chrysocoryne* Zoelln. must be considered, therefore, as a nomenclatural synonym of *Leucocoryne* Lindl., subgenus *Leucocoryne. Stemmatium* Phil. is reduced to a subgenus of *Leucocoryne.* The entities having three stamens (the epipetal series suppressed) appear as a further evolutionary step, which brought in a diversity of species.

Subgenus *Stemmatium* (Phil.) Rav., *comb nov.* genus *Leucocoryne* Lindl. *(Alliaceae)* Syn.—Genus *Stemmatium* Phil., Anal. Univ. Chile *43:* 551. 1873; *Chrysococoryne* Zoellner, Anal. Mus. Hist. Nat. Valparaiso *6:* 18. 1973 (type: *Leucocoryne narcissoides* Phil.)

KEY TO SUBGENERA OF LEUCOCORYNE

1a. Stamens three, androecium-appendages three ..... Subgenus 1. **Leucocoryne**
1b. Stamens six, androecium-appendages three or six ..... Subgenus 2. **Stemmatium**

KEY TO THE SPECIES OF SUBGENUS STEMMATIUM (PHIL.) RAV.

1a. Androecium appendages three, epipetal ..... 1. **L. dimorphopetala**
1b. Androecium appendages six, the episepal retuse, smaller than the epipetal 2. **L. narcissoides**

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1. **LEUCOCORYNE DIMORPHOPETALA** (GAY) RAV., **COMB. NOV.**

Tristagma dimorphopetala Gay, Hist. Fis. Pol. Chile, Bot. 6: 126, 1853; Atlas Hist. Fis. Pol. Chile 1 (Fanerog.): tab. 69 bis, 1854. - *Leucocoryne gayii* Baker, Jour. Linn. Soc. London 11: 375, 1871. - *Chrysocoryne oxypetala* sensu Zoellner Anal. Mus. Hist. Nat. Valp. 6: 24, 1973.-Excl. syn. *Leucocoryne oxypetala* Philippi, Anal. Univ. Chile 93: 270, 1896 (lectotype SGO 46765).

A rare species inhabiting certain places in the provinces of Coquimbo and Atacama, in the near north of Chile. It is found in the arid, and semiarid bushy steppe.

Specimens: In collibus Arqueros (prov. Coquimbo, Chile); leg. Gay 49a, 1836, (SGO 46740, type). - Chile, prov. Coquimbo, Llanos del Tofo; leg. Wagenchnekt, 15-IX-1943 (Herb. Rav., Herb. Looser at BAS). Idem, Ovalle; leg. V. Castillo de Gunckel, 10-X-1949 (Herb. Rav., Herb Gunckel at Santiago). Prov Atacama, Vallenar; leg. Simpfendörfer, 28-IX-1940 (Herb. Rav., Herb. Gunckel 19160 at Santiago).

2. **LEUCOCORYNE NARCISSOIDES** PHIL.

Philippi, Viaje Des. Atacam., Fl. Atacam.: 52 (Nr. 373), 1860. - *Stemmatium narcissoides* Philippi, Anal. Univ. Chile 43: 551, 1873.- *Leucocoryne incrassata* Philippi, loc. cit. 93: 272, 1896 (lecto-type SGO 46776). - *Chrisocoryne incrassata* (Phil.) Zoellner, Anal. Mus. Hist. Nat. Valp. 6: 24, fig., 1973.

A native of the province of Atacama, Chile. Its range overlaps, in some places, with the proceeding species.

Attempts were made for obtaining good preparations of chromosomes. The species seems to have a complement of $2n = 24$ chromosomes. Cave (1939), reports $2n = 12$ in *Leucocoryne ixioides* Lindl. Since the plants commonly cultivated in the United States as this species belong in *L. coquimbensis* Phil., it is possible that she employed material of the latter, rather than of the former.

Specimens: Chile, prov. Atacama, Cachinal de la Sierra; leg. Philippi (SGO 46752, type). Idem, Carrizal Bajo; leg. King (type of *Stemmatium narcissoides* Phil. SGO 46663, isotype SGO 46661). Idem. Carrizal Bajo; leg. F. Philippi, IX-1885 (SGO 38046, topotype). Idem, Travesía; leg. F. Philippi, IX-1885 (SGO 46662). Idem, Bandurrias; leg. Geisse (SGO 46660). Idem ibid. leg. ipse, 1886 (SGO 38047). Idem, Copiapó? Huasco?; leg. F. Philippi, 1878 (SGO 46664).

IV. STUDIES IN THE TRIBE GILLIESIEAE

1. A NEW **GILLIESIA** SPECIES FROM CENTRAL CHILE

Gilliesia curicana Rav., **sp. nov.**

Species a *G. graminea* affinis sed tepalo interiori-superiore longitudinis alterarum necnon angustiore appendicibus inferioribus columnae staminiferae planiusculis differt.

Scapus debilis circ. 12-30 cm longus. Inflorescentia 4-8-flora. Flores

a pedicello arcte recurvato cernui. Tepala sex; exteriora oblanceolata patentia ad 9.5-13 mm longa, inferius latius; interiora lanceolata reflexa ad 6.7-7 mm longa superius angustius. Columna staminifera ascendens antice ventricosa circ. 4.5 mm longa; appendices posteriores quattuor inconspicuis inaequilongi papilloso-tumescentes a paribus ad tepalos exteriores oppositi; lobi anteriores duis obcordati ad columnam adpressi; appendices laterales sex raro quattuor arquato-ligulati papilloso-tumescentes inter se inaequilongi. Pars libera filamentorum antheriferis perbrevis subtriangularis, laterales petalini conniventes 0.8-1 mm longi, inferius breviore 0.2-0.25 mm longum. Staminodiatria posteriora, paris sepalina linearia circ. 0.7 mm longa, petalinum obtusissimum subnullum. Ovarium subglobosum albicante inferne leviter angustatum ad 1.25 mm latum. Stylus curvato-ascendens oblongo-subulatum ad 2.1 mm longus. Stigma punctatus.

Plant up to 30-40 cm high. *Bulb* ovoid-oblong, 20-24 mm long, 7.5-9 mm wide, covered with brown coats, the basal plate very fragile. *Leaf* single, linear-ligulate, narrowed at both ends but especially downwards, pale green, slightly pruinose, spreading obliquely or almost decumbent, up to 10-20 cm long, 4-5 mm broad. *Scape* cylindrical, weak, pale green, up to 12-30 cm long, 1.8-2.8 mm broad below, 1.2-1.8 mm broad at the apex. *Spathe* bivalved, the valves unequal lanceolate, not marcescent, green, the outer tender, 22-26-5 mm long, clasping at the base, the inner 17-18.5 mm long, often slightly curved, membranous, almost translucent, narrowed above. *Inflorescence* 4-8-flowered. Flower *pedicels* very dissimilar in length, markedly recurvate above, bright green tinged brownish at the recurvate part, up to 25-65 mm long, fruiting often longer. *Flower* invertedly declined or facing obliquely downwards. *Tepals* six, purplish-brown, pale green near the base, the outer oblanceolate, spreading, sometimes slightly incurved, apiculate, both sides slightly revolute below, up to 9.5-12.5 mm long, the upper-lateral pair 2.8-3.2 mm broad, the lower 3.9-4.6 mm broad; inner tepals lanceolate, reflexed from the base, up to 6.7-6.9 mm long, the lower-lateral pair 1.5-1.6 mm broad, the upper 1 mm broad. *Staminal column* sack-shaped, ascending, the front ventricose, up to 4.5 mm long, whitish; back-appendages four, inconspicuous, horn-shaped, papillose-tumescent, opposed by pairs to the upper-lateral outer-tepals, 0.1-1.2 mm long, dark-purple; front-lobes two, obcordate, 1.8-1.9 mm long, adjunct to the staminal-column; lateral-appendages 4-6, tong-shaped, slightly curved, rather flat, disposed by pairs or threes on each side of the basal part of the staminal-cup, the appendages of each set being close together, and dissimilar in length, 1.2-3.3 mm long, papillose-tumescent, dark purple or greenish-purple. *Fertile stamens* three: the lateral epipetal pair, and the lower episepal. *Filaments* deltoid; the lateral connivent, 0.8-1 mm long, the lower shorter 0.2-0.25 mm long. *Anthers* reflexed from the base after dehiscence, simulating extrorse, yellow, connivent, 0.7-0.8 mm wide. *Staminodes* three, the lateral episepal pair, sublinear, 0.7 mm long, the upper epipetal very obtuse, almost obsolete. Ovary subglobose, whitish, slightly narrowed below,

1.25 mm wide. *Style* rather declined, obclavate, up to 2.1 mm long. *Stigma* punctiform.

Habitat.—A native of the first Andean slopes of the province of Curicó, in Central Chile. It was found in a brown, sandy soil, on the slopes near a rocky, torrential river, at Fundo Las Tablas. The species often grows near *Sisyrinchium junceum* ssp. *costulatum* ssp. nov., *Solenomelus pedunculatus* (Irid.), *Bomarea salsilla, Oxalis* sp., and other herbs; *Sophora* sp. (Legum.), and *Aristotelia chilensis* are common bushes in the environment; the tree-representatives *Nothofagus dombeyii, N. oblicua, N. alpina,* and *Cryptocarya alba,* are found nearby.

Specimens: In decliviis secus flumine in praedio Las Tablas provinciae Curicó Chiliae; leg Ravenna 3001, 23-X-1976 (typus in Herb. Ravennae, isotypi NY, K, TRA, E, C, US, SGO). Chile, Talca; leg. C. Grandjot (Herb. Rav., Herb. Gunckel).

The different kind of appendages, and lobes, at the base of the stamical cup were so far considered, in the literature, either as "corona," or "paraperigons". A close examination reveals, however, that these tissue "excrecences" arise from the staminal cup, where they actually belong.

With entire appendages, the species approaches to *G. graminea.* The rest of the species, *G. montana,* and *G. monophylla,* bear broader, fimbriate or snipped appendages. *G. graminea* differs from our species in having the upper inner-tepal obsolete, and almost filiform, non-flat, lateral appendages.

The locality datum "Talca", of the last specimen cited, seems doubtful, or at least incomplete.

2. A NEW **SPEEA** SPECIES FROM CENTRAL CHILE

Speea triloba Rav., **sp. nov.**

A *Speea humili* floribus saepe majoribus filamentis liberis stigmate trifido lobis crassiusculis linguiformibus recedit.

Planta usque 8-11 cm alta. Bulbus ovatus ad 22-32 (-33) mm longus circ. 10-20 (-24?) mm latus tunicis tenuis ochraceo-cinereis membranceis vestitus radicis tenuis capillaceis emitens. Folia linearia basin versus attenuata ad 10-20 cm longa circ. 2.5-4.5 mm lata. Scapus teres gracilis 5-8 cm longus. Spathae valvae membranaceae valde translucideae, exterior lanceolato-attenuata ad 22-24 mm longa inferne marginibus circ. 4-6 mm connatis, interior 15-18 mm longa. Inflorescentia 1-3-flora. Pedicelli distincte deflexi 10-14 mm longi. Flores stellati inferne urceolati ad 30-70 mm lati. Tepala lanceolato attenuata subflagellata ad basin leviter cuculata, exteriora 2.1-5.1 mm longa circ. 4.5-6 mm lata, interiora 17-29 mm longa circ. 3-5.5 mm lata. Filamenta libera triangulari-elongata superne angustata inferne usque 1.5 mm dense glanduloso-papillosa, sepalina 24-25 mm longa, petalina circ. 0.15 mm longiora. Antherea e basin reflexae obovato-aellypticae 1-1.1 mm longae. Ovarium aellypticum ad 2.5 mm longum circ. 1.5-1.6 mm latum; ovula in loculis plura. Stylus teres 2.7 mm longus. Stigma

trifidus lobis lingulatis circ. 0.85-0.9 mm longi.

Plant up to 8-11 cm high. *Bulb* ovoid, 22-32 (-33) mm long, 10-20 (-24?) mm wide, covered by thin, grayish-brown membranous coats; pseudo-neck absent or very short. *Roots* very thin, capillary. *Leaves* linear markedly narrowed downwards, 10-20 mm long, 2.5-4.5 mm broad. *Scape* cylindrical, weak, probably declined 5-8 cm long. *Spathe-valves* membranous, pale, translucent; the outer lance-attenuate, 22-24 mm long, its margins connate for 4-6 mm; the inner smaller, 15-18 mm long. *Inflorescence* 1-3-flowered. *Pedicels* markedly deflexed, 10-14 mm long. *Flowers* stellate, urceolate below, 30-70 mm across. *Tepals* lance-attenuate, subglagellate, slightly cucullate at the base; the outer 2-1-5.1 mm long, 4.5-6 mm broad, the inner 17-29 mm long, 3-5.5 mm broad. Filaments free, almost-triangular, narrowed above, densely glandulose-papillose for more than half of its length; the episepal 24-25 mm long, the epipetal 0.15 mm longer. *Anthers* reflexed from their base after dehiscence, simulating extrorse, obovate-ellyptical, 1-1.1 mm ling. *Ovary* ellypsoid, 2.5 mm long, 1.5-1.6 mm wide; ovules several, about 7-9 in each cell. *Style* cylindrical; 2-7 mm long. *Stigma* trifid, its lobes lingulate, 0.85-0.9 mm long.

Specimens: Chile, prov. Santiago, Cerro Polpaico, Laguna Chicauma, 1700 m; leg. Gertrudis Grandjot, 15-VIII-1940 (type Herb. Ravennae, isotypes Herb. Gunckel 45292 at Santiago, and SGO 76081).

This interesting species, the second in the genus, differs from *Speea humilis* (Phil.) Loes in its larger flowers, free filaments, and trifid stigma. It is known only from the type-locality.

3. **GETHIUM** AND **ANCRUMIA** REFERRED TO THE GENUS **SOLARIA**

Philippi (1858), proposed the genus *Solaria,* with *S. miersioides* Phil. as the type. The species bears three fertile stamens, to wit, the lateral epipetal pair, and the lower episepal one, and three staminodes; the filaments being united for much of their length in a conical column. Reiche (1893), adds another species, *S. major* Reiche, which follows the same pattern.

Ravenna (1967) describes *S. attenuata* Rav., as a new species from the Andes of south-western Argentina and Central Chile. The androecium of this was interpreted, from material available at that time, as having three fertile stamens and one staminode. On examining more specimens later from the type collection, and others from Chile, it was revealed that the supposed "staminode" actually was a small strip of the staminal column, which was broken in that point. The species, therefore, has only three stamens, and no staminodes.

As stated earlier (Ravenna 1967) "*Ancrumia* departs from *Solaria* merely in having only two fertile stamens, and three staminodes, which might be a difference of specific level". *Gethyum atropurpureum* Phil., the only species in the genus, bears three fertile stamens, and no staminodes, as in *Solaria attenuata* Rav. Everything in the vegatative characters perigone, and gynoeceum of *Gethyum,* and *Ancrumia,* agree essentially with *Solaria.* Eventually, the presence or absence of staminodes, and two or three stamens, may be considered as of minor signifi-

cance. In my opinion, *Ancrumia cuspidata* Harv. ex Bak, and *Gethyum atropurpureum* Phil. are better placed in *Solaria.*

Solaria atropurpurea (Phil.) Rav., comb. nov.

Gethyum atropurpureum Philippi, Anal. Univ. Chile 43: 549, 1873. A native of a single ravine of the Cerro San Ramón, near Santiago, Chile.

Specimens: Chile, prov. Santiago, quebrada de Peñalolén; leg. M. Cienfuegos & J. Hernández, X-1871 (type SGO 46712, isotype SGO 46711). Idem ibid.; leg. C. Grandjot, 13-XI-1933 (SGO 64646). Idem ibid.; leg. K. Reiche, X-1909 (SGO 46849). Idem ibid.; leg. ipse, X-1909 (SGO 46850). Idem ibid.; leg. ipse, X-1909 (SGO 46951). Idem ibid.; leg. Gunckel 35911 (Herb. Rav., Herb. Gunckel at Santiago).

Solaria cuspidata (Harv. ex Bak.) Rav., comb. nov.

Harvey ex Baker in Hooker's Icon. Pl. 13: tab. 1227, 1877.

Rather frequent along the coast of the province of Coquimbo, from the mouth of the Limarí river, to the vicinity of the town of Coquimbo and probably further north.

Specimens: Chile, prov. Coquimbo, Parque Nac. Fray Jorge; leg. C. Jiles, 22-VIII-1948 (SGO 70826). Idem ibid., lomajes, 170 m, 22-VIII-1948 (SGO 70827). Quebrada La Placa, cerca de la torre, en el camino a Tongoy; leg. R. Wagenknecht 138 W, 19-VIII-1943 (SGO 60486). Idem, prope marem ad latum-septentrionalem oris fluminis Limarí; leg. Ravenna 1410, VIII-1971 (Herb. Rav.). Idem, Coquimbo, Guayacán; leg. Gunckel 45306, 18-IX-1934 (Herb. Rav., Herb. Gunckel at Santiago), in fruit. Idem, Cerro Pan de Azúcar, cerca de La Serena; leg. Gunckel 296, 3-VIII-1948 (Herb. Gunckel 41389 at Santiago, Herb. Rav.).

ACKNOWLEDGEMENTS

I wish to thank Dr. Gert Hatschbach for his consistent sending of herbarium material of my interest, and for orientating and helping me in finding several species in the field, during the time I spent in the State of Paraná, Brazil; Prof. Hugo Gunckel, of Santiago, Chile, for making his personal herbarium available to my studies, and for presenting me several duplicate-specimens; Mr. Gualterio Looser for the same facilities concerning his own herbarium; and to the following Herbaria for their cooperation: NY, SGO, UB, Herb. Est. Exp. C. del Urug. (I.N.T.A.).

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FURCRAEA BOLIVIENSIS NOV. SP. (AGAVACEAE)

PIERFELICE RAVENNA,

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While exploring in the department of Cochabamba, Bolivia, in March 1976, an apparently new species of *Furcraea* (Agavaceae), was discovered. Several small populations were investigated, unfortunately without success, in an attempt to find flowers. Nevertheless, since it is easily separable from the rest of the species, I am describing it from the vegetative characters. It is the only species of the genus, so far recorded, that truly belongs in the Bolivian flora. Others as *F.* aff *occidentalis* Trel., and *F. foetida* (L.) Hawk. (syn. *F. gigantea* Vent.), are sometimes seen as escapes.

F. boliviensis apparently is the species associated, with some doubt, with *F. longaeva* by Trelease (1929). This author says: "A similar if separable species is reported for Bolivia". Foster (1958), recorded in Bolivia a "*Furcraea* sp."

The species seems to be related with *F. pubescens* Tod., a native of Mexico, rather than with *F. longaeva,* which, according to Baker (1888), has a 12-15 m long trunk. *F. andina* Trel. is an allied species, with prickles normally reaching 6 mm or more in length.

A small-sized plant is now cultivated, near buildings, at the Reserva Florestal Federal "Cabeza de Veado", in the vicinity of Brasilia city; another with me at Santiago.

Furcraea boliviensis Rav. **sp. nov.**

Planta usque 90-100 cm alta circ. 1-1.40 m in diametro inferne stipite lignoso saepe subreptante crasso ad 30-40 cm longo circ. 10-15 cm lato instructa. Folia rosulata ensiformia rigida saepe patentia modice canaliculata cinereo-viridia haud pruinosa ad 45-55 cm longa rarius ultra circ. 8-10 cm lata prope basin leviter angustata ad lateras spinis uncinatis parvis inter se valde proximis ad apicem aculeo unico armata.

Plant up to 90-100 cm high, 1-1.40 m in diameter, with a short sometimes prostrate, stout trunk below; this 30-40 cm long, 10-15 cm

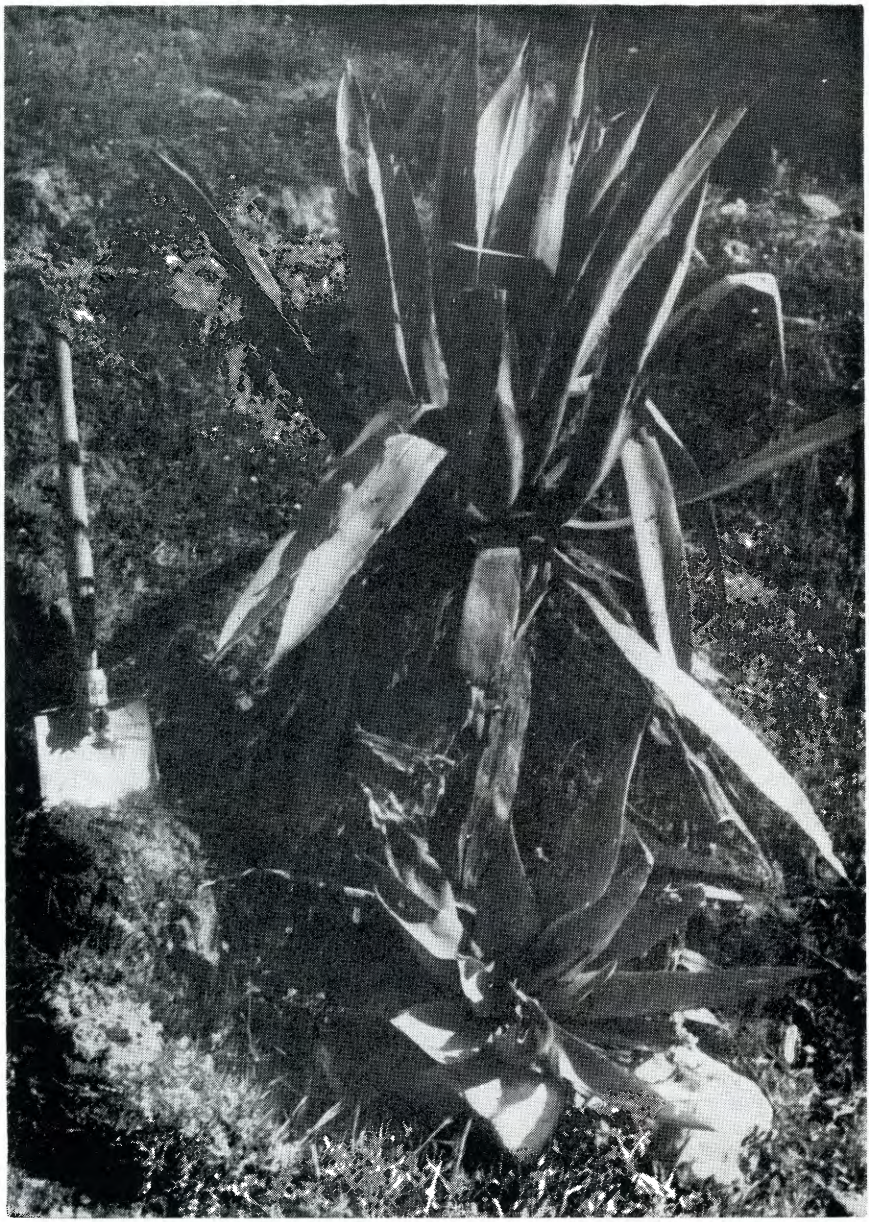

Fig. 28. **Furcraea boliviensis** Rav., **sp. nov.,** two plants brought down to Chaguarani from type locality. Photo P. Ravenna

wide. *Leaves* rosulate, ensiform, rigid, often spreading, moderately channelled, thick, an opaque ash-green, up to 45-55 cm long, rarely longer, 8-10 cm broad, slightly narrowed near the base, bearing on both sides, rather proximate, uncinate, small prickles, not exceeding 3 mm in length, and, at the apex an acute pungent point.

Habitat.—Rather infrequent on the mountains of the province of Mizque, Dept. of Cochabamba, Bolivia. It forms small populations, under partial shade, growing among rocks or simply on the slopes, in a dark, sandy soil, commonly at 3500 m of altitude. It is also found at 2600-2700 m near Chaguarani, in the same province, but possibly brought there in some manner by man; in the latter area it grows in a sandy, reddish clay. The same or an allied species, inhabits the slopes with philitic stones, in the drier, warmer region between Aiquile and Sucre.

Specimens: Prope cacuminem montis supra argentifodinam "Asientos" ad viam Chaguarani prov. Mizque civit. Cochabamba Boliviae; leg. Ravenna 2305, II-1976 (typus in Herb. Rav.).

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