HERBERTIA

1948

THE AMERICAN PLANT LIFE SOCIETY

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The American Plant Life Society

Box 2398, Stanford, California

HERBERTIA

VOLUME 15

2ND SOUTH AFRICAN EDITION

EDITED BY
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Mr. E. Frederick Smith, Membership Secretary,

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Box 2398, Stanford, California

PREFACE

The present issue of HERBERTIA is the 15th volume in the series. As indicated in Vol. 10, it is suggested that the issues be bound in groups of five for ready reference. To this end, the title page and accompanying pages, for vols. 1—5, incl., and vols. 6—10, incl., were included at the end of vol. 10; and those for vols. 11—15, incl., are included at the end of the present volume (vol. 15). An index volume to vols. 1—15, incl., will be published separately, and will be announced as soon as ready.

It is with the deepest regret that we record the death of Mr. J. Marion Shull. He died unexpectedly of cerebral hemorrhage on September 1, 1948, at the age of 76 years. He had prepared with keen insight the article on Kodachromes for 1948 HERBERTIA a few weeks prior to his death, and at the time of his passing he left the unfinished cover design for 1948 PLANT LIFE. Apparently this was his last artistic work, and although it was unfinished, it was far enough along so that it could be used for the intended purpose as the cover design of the AROID LILY EDITION of PLANT LIFE. We also record with the deepest regret the death of Mr. Fred H. Howard, and Mr. Dickinson in 1948. In memoriam notices for all three will appear in 1949 HERBERTIA.

This 2ND SOUTH AFRICAN EDITION of HERBERTIA is dedicated to Dr. R. A. Dyer, who received the 1948 HERBERT MEDAL for his valuable article on the genus *Cyrtanthus* that appeared in 1939 HERBERTIA. In the present issue Dr. Dyer favors us with a brief autobiography, and articles on "Further Records of South African Amaryllids" and a new *Crinum* species. Other contributions from South Africa are, "The Clivias at Scott's Farm, Grahamtown" by Mrs. Cythna Forssman, who also produced the beautiful cover design based on "a drawing in Heister's original work on the genus *Brunsvigia* (1755) and is not intended to be botanically correct"; and "Notes on Some Cultivated *Amaryllidaceae* in Transvaal, South Africa." In addition there is a report on South African raised hybrid *Amaryllis* by Mr. A. C. Buller, and the first installment of two articles by Mrs. Coombs on "South African Amaryllids as Pot Plants." A request for articles was sent to the scientists at the BOTANICAL GARDEN, STELLENBOSCH, but the articles had not arrived at the time of publication, apparently due to post war conditions. We hope that they will again be represented when the 3RD SOUTH AFRICAN EDITION is published at a later date.

There has been a generous response for other amaryllid articles. Capt. Harding contributes notes on the amaryllids of the Holy Land. There are some very interesting reports from the *Hemerocallis* Trial Gardens at Greenwood Park, Des Moines, Iowa; the Texas Agric. Expt. Station; the University of Florida, and Cornell University. Mr. Gilmer, Miss Lawrence, Mr. Ballard, Dr. Cooley and Mr. Saxton have also favored us with valuable articles on *Hemerocallis*.

In addition to the article on the Buller Hybrid *Amaryllis*, Mr. Smith, Mr. Hermon Brown, Mr. Hayward, Ludwig & Co., and Dr. DuPuis also contribute articles on this popular group of plants. The reader's attention is directed particularly to the stimulating article on growing

Amaryllis in the home by Mr. Leonard C. Smith. It is hoped that this revealing article will stimulate others to write about their similar experiences with hybrid *Amaryllis.*

There are also interesting articles by Messrs. Foster and Boehringer on Alstroemerias; Dr. Brierley on Amaryllid diseases; Dr. Anderson, Mr. Wilson, Mr. Hornback, Mr. de Graaff, Mr. Ballard, Dr. Cooley, and Mr. Mitch on *Narcissus;* Mr. Purdy on BRODIAEA LILIES; Mr. Hannibal on *Haemanthus;* Mr. Hayward on Crinums; and Mrs. Strout and Mr. Wolfe on various amaryllids.

The 1949 issue of Herbertia will be the 1ST AUSTRALIAN EDITION, and it will be published in December 1949. The HYBRID AMARYLLIS EDITION, dedicated to Mrs. Mary G. Henry, will appear early in 1950.

Hamilton P. Traub
September 20, 1948 *Harold N. Moldenke*

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When taking photographs of amaryllids, an effort should be made to include the whole plant—*stem,* if any, *leaves, scape* and *flowers.* Separate views of the *bulb* and *roots* are also valuable in some cases. These remarks do not apply to cut-flowers.

NOTE FOR MEMBERS AND LIBRARIANS

The first series of HERBERTIA, comprising vols. 1—15, incl. (1934—1948), is completed with the present issue. For convenience in reference, it is suggested that these volumes be bound in groups of five. The title pages for binding vols. 1—5, incl., and vols. 6—10, incl., will be found at the end of Vol. 10; and the title pages for vols. 11—15, incl., will be found at the end of the present volume. A separate index volume for vols. 1—15, incl. (1934—1948), will be published as soon as practicable. Publication date and price of the index volume will be announced later.

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CORRIGENDA

HERBERTIA, VOL. 13 (1946) 1948

Page 3, 17th line (text) from top, for "of" read "for."
Page 99, under 6b, B-2, for "telapsegs" read "tepalsegs."
Page 100, 10th line from top, for "petelapseg" read "petepalseg."

CORRIGENDA

HERBERTIA, VOL. 14 (1947) 1948

Page 19, 16th line from top, for "*sparaxis*" read "*Sparaxis.*"
Page 22, 6th line from top, for "*pariviflora*" read "*parviflora.*"
Page 56, 21st line from bottom, for "Hebertia" read "Herbertia."
Page 58, 19th line from top, for "below" read "above."
Page 62, 6th line from bottom, for "*Thumbergi*" read "*Thunbergii.*"
Page 87, 7th line from top, for "GALANTEAE" read "GALANTHEAE."
13th line from top, before "Europe" add "North Africa,".
Page 90, 5th line from top, for "*Salisb.*" read "Salisb.".
20th line from top, for "ed. 1289" read "ed. 1, 289."
Page 92, 21st line from bottom, for "REJECTED" read "EXCLUDED."
Page 93, under 1b, 3rd line, after "not lobed" add "except *L. Valentinum.*"
Page 96, 2nd line from top, for "(Simonkia)" read "(Simonkai)."
Page 97, 1st line from top, after "not lobed" add "except in *L. Valentinum.*"
4th line from top, for "five" read "seven."
Page 99, 21st line from bottom, for "1-valved" read "1- or 2-valved."
Page 103, 5th line from top, for "Subgenusl" read "Subgenus 1.".
29th line from top, 9b, for "(Caucasus)" read "(Transcaucasus)".
Page 106, 7th line from top, for "*Algae-Reginae*" read "*Olgae-Reginae*".
Pages 106 & 107, place species 4 above species 5.
Page 107, species 6, 2nd line, for "Shed." read "Sched.".
Page 109, 4th line from top, for "*Imperiati*" read "*Imperati*".
Page 115, 2nd column, 2nd line, for "*Imperiati*" read "*Imperati*".
Page 153, 9th line from bottom, for "above" read "below."

Dedicated to
Dr. R. Allen Dyer

Herbert Medalist— R. Allen Dyer

Plate 314

R. ALLEN DYER

An autobiography

The preparation of an autobiography is the penalty expected of a Herbert Medalist. Before I begin mine I wish to express my deep appreciation of the high honour of this award. It is too great a distinction for so small a contribution as I have made to the cause of the *Amaryllidaceae*. It would embarrass me more, were it not for the knowledge that it is a tribute at the same time to the *Amaryllidaceae* of South Africa, a group which has given to members of the society so much of beauty and interest. I am merely their representative for a fleeting hour, but let that pass.

My birthday was on 21st September 1900, the event taking place in the Union of South Africa, at Pietermaritzburg. My earliest memories are connected with gardening, for it was a family hobby. Within a stone's throw of our home in Jesmond Road, were growing wild groups of *Crinum* and an abundance of *Cyrtanthus* or "Fire Lily."

Throughout my youth my interest in nature persisted. It had a setback through rheumatism, which laid me low in 1910 and dogged me at varying intervals for 20 years. It prevented me from completing the matric at Michaelhouse, where I had been a boarder from 1914, and this exam obstacle in ones education was eventually passed at St. Charles. Thus it was in 1920, at the Natal University College, Pietermaritzburg, that I began a science course with Botany (under Professor J. W. Bews) and Chemistry (under Professor R. B. Dennison) as major subjects. The B.Sc. was completed in 1922, and the M.Sc. in 1923. For a year after this I was occupied as a sugar chemist in Zululand, but an opening as a botanist in the Division of Plant Industry then came my way, and my botanical career began on 1st April, 1925, at Pretoria. After a fortnight there, I had my first transfer, which landed me in Grahamstown as assistant to Professor S. Schonland, who in addition to his university appointment, was then an honorary member of the Botanical Survey Advisory Committee. On Professor Schonland's retirement on 1st June 1926, I was placed in charge of the Botanical Survey of the Eastern Cape Area and at the same time was elected Honorary Curator of the Albany Museum Herbarium, Grahamstown.

My first avenues of botanical research were largely influenced by my contacts with Professor Schonland and Dr. R. Marloth, (whose portrait was reproduced in Herbertia vol. 6: 19 (1939) 1940). From these two eminent botanists I formed an early interest in succulents, and in particular, in the large genera *Crassula* and *Euphorbia*. For official reasons, however, my research has always covered a fairly diverse field.

The next and possibly the most important milestone in my career was my transfer oversea in January 1931, as botanist for the Union of South Africa at the Royal Botanist Gardens, Kew. The many facilities and contacts with eminent botanists, including Dr. J. Hutchinson (to mention only the one who has been introduced to readers of Herbertia by his

photograph in Vol. 6 as Herbert Medalist for 1939) have been a lasting benefit. During the time oversea it was my further good fortune to visit the main continental herbaria at Uppsala, Stockholm, Berlin, Vienna, Zurich, Geneva, Paris, Strasbourg and Leiden. It will doubtless be of interest to explain that the South African Government instituted a system of rotation of botanists to Kew in 1926, each officer to remain there for a period of two to three years.

On my return from Kew in 1934, I was again stationed at the National Herbarium, Pretoria, which has since remained my headquarters. It was in the following year that I was elected as a corresponding member of your Society, and I was soon busy with the preparation of an "Introduction to South African Amaryllidaceae" which appeared in Herbertia 3: 1936. Since then I have always kept a weather-eye open for interesting information about the family. In addition to my work on the genus *Cyrtanthus,* published in Herbertia Vol. 6, I have added several lesser contributions in Herbertia and in Flowering Plants of South Africa.

1937 proved another eventful year for me. My thesis on the vegetation of the Districts of Albany and Bathurst in the eastern Cape Province was accepted for the D.Sc. degree, and I had the privilege of a fortnight's trip on H. M. S. Carlisle to visit Thistan da Cunha. I reported later that I made no record of *Amaryllidaceae* on that "lonely" island, which is half way between the Cape of Good Hope and South America.

But the *Amaryllidaceae* did not cause my first excursion into American botanical literature. My interest in *Euphorbia* had drawn me into the Euphorbia Review of 1935 and into the Cactus and Succulent Journal not long after, while I was already in correspondence about *Stapelieae* with the two Americans, Alain White and Boyd Sloane. Later the three of us were associated in the production of two sizable volumes on the Succulent Euphorbieae of Southern Africa, published in 1941. In recognition of this we were elected Fellows of the Cactus and Succulent Society of America in that year, and in the following year the triumvirate were awarded Senior Captain Scott medals by the South African Biological Society.

Some further recognition of my botanical work was my admission in 1944 as a Fellow of the Royal Society of South Africa.

The quota which I have extracted from official hours has not been a complete deterrent to my taking an active interest in science and horticulture generally. From 1935, I occupied the position of Honorary Treasurer to the South African Biological Society, only to relinquish it this year to become President. Almost continuously during the same period, I have been Recorder of the Botanical Section at the annual conferences of the South African Association for the Advancement of Science, being President of the Section in 1941.

In 1943 the local Horticultural Society ran short of an Editor for their monthly bulletin known as The Pretoria Gardener, with the result that this was another straw added to the load of hay. One could mention

other distractions. I am hardly a model civil servant, for with all this I have over 450 days accrued leave.

Progress in my official capacity has been steady, even if not spectacular. The final relatively big jump in 1944 to Chief of the Division of Botany and Plant Pathology, on the retirement of my Chief, Dr. E. Percy Phillips, was by no means a foregone conclusion. The post of Chief carries with it, the Honorary title of Director of Botanical Survey, and the Editorship of South African Flowering Plants, the publication freely referred to by me in Herbertia, 1936. The attendant administrative duties of my present post are its least attractive aspects.

In my youth I was particularly keen on sport, representing my school and university college in rugby and cricket, and on occasions even representing my town in rugby and hockey. Do I mention also that I married Adeline Beatrice Cooke in 1926, and have three children, none of whom is taking up botany as a career. It is often remarked that a botanist by profession rarely chooses gardening as a hobby. My main hobby is still gardening.

FURTHER RECORDS OF **AMARYLLIDACEAE** IN SOUTH AFRICA

R. A. Dyer

The article entitled "An Introduction to South African Amaryllidaceae" in Herbertia 3:37 (1936) was based largely on the species illustrated in the periodical "Flowering Plants of South Africa." In the next volume of Herbertia, p. 12, additional information was given, including a reference to *Cyrtanthus tuckii*. The particular plant in question was later illustrated in "Flowering Plants of South Africa" (F. P. S. A. 17:1937 plate 680) under the varietal name *C. tuckii* var. *transvaalensis* Verdoorn. The reference in Herbertia (l.c.) to the possible illustration of *Nerine* species was implemented in "Flowering Plants of South Africa" on Plates 658 and 679, where *N. angustifolia* Baker and *N. gracilis* R. A. Dyer, respectively, were figured, and the latter described for the first time.

Since the original description of *N. gracilis*, a Transvaal species, will not be available to many readers of Herbertia the main characters will be repeated here: Nerine gracilis R. A. Dyer, Herbertia plate 315, fig. 1 and 1a. *Bulb* 1.5—2 cm. thick, elliptic-globose, contracted into a neck 3.5—5 cm. long, covered by membranous remains of leaf-bases. *Leaves* 3—5, contemporary with the flowers, up to 30 cm. long, 1.5—2 mm. thick, filiform, subterete, concave or shallowly canaliculate above, very minutely papillate. *Peduncle* terete, slender, shorter than the leaves, up to 20 cm. long, 2—2.5 mm. thick, very minutely papillate and occasionally with a few scattered, transparent hairs. Spathe-valves more or less 2 cm. long, narrowly lanceolate-acuminate. *Flowers* 8—10 in a centripetal umbel, markedly protandrous. *Pedicels* 4—7 cm. long, 1 mm. thick, terete. *Perianth-segments* about 1 cm. long, the outer ones about 4.5 mm. broad and the inner ones slightly broader, elliptic-oblong, rose pink (Ridgway

XII) green-keeled on the back above the middle, with the margin undulate minutely cuspidate at the apex. *Filaments* appendiculate behind the base with an oblong deeply 2—3-lobed rarely fimbriate process, at first sub-erect, later decurved after dehiscing of anthers; anthers 2.5 mm. long, oblong, the three opposite the inner perianth-segments maturing before the others. *Ovary* triangular; style at first decurved, later erect; stigma minutely trilobed. *Capsule* obtusely trilobed or subglobose, with 1—2 subglobose seeds in each cell.

In "Flowering Plants of South Africa" 1937 also, *Tulbaghia alliacea* L. f. was figured on plate 653. This is an old established species and needs no elaboration, but comments on the genus will be found later under *T. ludwigiana* Harv. More well documented species in the family appeared in the following volume; *Cyrtanthus flanagani* Baker (plate 693), *Haemanthus nelsonii* Baker (plate 695), the ill fated *Ammocharis coranica* Herb. (plate 712), the less known *Nerine frithii* L. Bolus (plate 691) and *N. hesseoides* L. Bolus (a new species on F. P. S. A. plate 683). *Ammocharis coranica* is termed ill fated because it was first figured (plate 230) under the name *Buphane disticha* and in plate 712 the old leaves are shown with tips intact, whereas in nature they are always shrivelled. In the text for *N. frithii,* Dr. Bolus is of the opinion that the plant previously published under that name (F. P. S. A. plate 132) is distinct and it is given the specific epithet *transvaalensis.*

Nerine *hesseoides* L. Bolus, Herbertia Plate 315, fig. 2. The description runs as follows: *Plant* glaborous, 17—25 cm. high., *Bulb* ovate, up to 3 cm. long, 1.7 cm. diameter, produced into a neck; outer tunics thin and papery. *Leaves* 2—7, synanthous, linear, flat or slightly sulcate above, rounded below, up to 18 cm. long, 1—1.5 mm. broad. *Peduncle* terete, scarcely 2 mm. diam. *Spathes* up to 2.5 cm. long. *Umbel* centripetal, 6—14-flowered. *Pedicels* ascending or erect, 2—3 cm. long. *Perianth-segments* regularly placed as in the genus *Hessea,* linear, widened upwards, broadest near the middle, obtuse, margins conspicuously undulate in the lower part, usually up to 1 cm. long, up to 3.5 mm. broad. *Filaments* at first decurved, then erect, finally almost regularly disposed in the flower, unequal in length, 4—5.5 mm. long, appendiculate at base, the appendages almost free to the base, somewhat spreading upwards, acuminate, usually entire, up to 2 mm. long; anthers before dehiscence 1—2 mm. long; pollen whitish. *Style* at first decurved, finally curved upwards; stigma minutely lobed. *Ovary* at first acutely angled, 1.5—2 mm. long, 1.5 mm. diameter. *Capsule* globose, 6 mm. diameter.

Exceptionally, *Amaryllidaceae* were not represented in "Flowering Plants of South Africa" Vol. 19 (1939) and in Vol. 20 (1940) there was only one, namely *Haemanthus namaquensis* R. A. Dyer (plate 793). This plant, described then for the first time was an interesting addition to the genus. It occurs in those very arid parts in the west of Namaqualand near Steinkopf. Only two bulbs attached to each other were located and fortunately one of them flowered at Pretoria for figuring. The description is as follows:

Haemanthus namaquensis R. A. Dyer, Herbertia Plate 315, fig. 3 and 3a. *Bulb* compressed, flattened on two sides, composed of thick

South African amaryllids— 1. **Nerine gracilis** R. A. Dyer; 1a. same, section of leaf enlarged. 2. **Nerine hesseoides** L. Bolus. 3. **Haemanthus namaquensis** R. A. Dyer, 3a. same, bulb and leaf reduced.
Plate 315

bifarious scales, up to 10 cm. high, 12 cm. broad, 6.5 cm. thick, with a solid concave base, young scales pinkish. *Leaves* 2, suberect, lorate, up to 40 cm. long, 7.5—9.5 cm. broad, glabrous, without cilia on margin, somewhat undulate on the margin, and this more pronounced towards the base, somewhat glaucous, on inner and outer surface towards the base purple spotted and shortly banded with red. *Peduncle* about 8 cm. long, erect, compressed 1.4—1.5 cm. in its greater diameter, red. *Umbel* dense, surrounded by 7—8 large bracts with a few narrower ones within; outer bracts oblong, 3.25 cm. long, up to 1.4 cm. broad, obtuse, bright red, imbricate, erect. *Flowers* dense, well exserted from the bracts. *Pedicels* 1.5—2 cm. long, slender. *Perianth* about 2.3 cm. long, light pink towards the base, darker above, especially on the tips of the lobes; tube 4—5 mm. long; outer lobes 1.8—2 cm. long; inner lobes slightly shorter, thickened towards the tips and with a minute tuft of hairs from the inner surface of the apex. *Stamens* exserted from the perianth, about 3 cm. long. *Ovary* 4—5 mm. long, each cell with one ovule; style nearly equalling the stamens; stigma minutely 3-lobed.

In 1941 it was possible to figure that interesting plant *Cyrtanthus guthrieae* L. Bolus. As I have twice quoted the author's statement that "the spread of the perianth and the relatively *long* tube are more characteristic of *Vallota* than *Cyrtanthus*" it is as well to state that the author meant to write "relatively *short* tube," that is the perianth tube relative to the segments in the genus *Cyrtanthus*.

Following on the account of the genus *Cyrtanthus* in HERBERTIA 6 (1939) 1940 it was unexpected that two distinct plants would soon be received from the well botanised neighbourhood of Port Elizabeth. These were described under plates 867 and 868 of "Flowering Plants of South Africa" 1942, with the names *Cyrtanthus affinis* and *C. speciosus* respectively, while the beautiful *Nerine bowdeni* W. Watson followed on plate 841. To augment my account of the genus *Cyranthus* in HERBERTIA the two descriptions are added:

CYRTANTHUS AFFINIS R. A. Dyer, Herbertia Plate 316, fig. 1. *Bulb* egg-shaped, about 3.5 cm. in diameter, with a short neck 1—2 cm. long. *Leaves* 1—3, contemporary with the flowers, linear, 20—35 cm. long or sometimes longer, about 0.8—1 cm. broad, spreading, tapering gradually to a narrow base; not or only slightly twisted and the older ones occasionally recurved towards the apex; margin slightly folded upwards. *Peduncle* slender erect, about 15—18 cm. tall, 4—5 mm. diameter, hollow above solid towards the base. *Spathe-valves* 2—3, oblong or linear-lanceolate, up to 4 cm. long. *Pedicels* 1.5—3 cm. long. *Flowers* 1—4 on each peduncle, suberect or somewhat spreading; perianth white with cream tinge down centre of each segment, passing to light green at the base (flower white with pink marking; Copeman), about 4 cm. long or occasionally up to 5 cm. long; tube 2.25 cm. long with a short slender cylindric base from which it is dilated somewhat abruptly and thence gradually to the throat about 1.5 cm. wide; lobes ovate-oblong, 1.5—2 cm. or occasionally up to 2.3 cm. long. *Stamens* biseriate, included. *Style* exserted from the tube, trilobed.

This species is related to *C. clavatus* (L'Hérit.) R. A. Dyer but is a more robust plant generally, usually having far larger leaves and more than one flower to the umbel.

CYRTANTHUS SPECIOSUS R. A. Dyer, Herbertia Plate 316, fig. 2. *Bulb* subglobose, 4—6 cm. broad, slightly broader than tall, with a short neck about 2 cm. long. *Leaves* 1—3, contemporary with the flowers, 25—35 cm. long or somewhat longer, 1.25—2 cm. broad, spreading, recurved or curled inwards towards the tips but not spirally twisted, tapering gradually to apex and base, ribbed below and with margins folded upwards. *Peduncle* slender, erect, 5—7 mm. diameter, about 15—18 cm. long, hollow above and solid towards the base. *Spathe-valves* 3, oblong to linear-lanceolate, up to 4 cm. long, the outermost being the largest. *Pedicels* 0.5—3 cm. long. *Flowers* 2—6 on each peduncle, spreading or suberect; perianth creamy white with broad red or pink band down the centre of each segment, paling towards the tip, green with pink tinge towards the base, the intensity of colour being variable, 6—8 cm. long or slightly longer; tube 4—5.5. cm. long, evenly dilated from the base to the throat 1.5—2 cm. wide; lobes oblong-lanceolate, 2—2.5 cm. long, apiculate. *Stamens* inserted in 2 rows; the upper row slightly below the mouth and the anthers reaching the mouth. *Style* exserted, trilobed.

This species is closely related to *C. smithiae* Watt, but the leaves of the latter are strongly spirally twisted, whereas those of *C. speciosus* are not.

Following these, there were in 1943 *Clivia caulescens* R. A. Dyer (plate 891) and *Cryptostephanus vansonii* Verdoorn (plate 885) and *Crinum buphanoides* Welwitsch (plate 887). The first two species were then published for the first time and deserve some comment here.

CLIVIA CAULESCENS R. A. Dyer, Herbertia Plate 316, fig. 3. This is not altogether unlike *C. nobilis* Lindl. in its inflorescence, but is unusual in the genus in the development of a stout stem up to 1½ ft. long. It occurs in and near forests of the north-eastern Transvaal, growing in leaf mould amongst rocks, or sometimes even as an epiphyte several feet above the forest floor on slanting tree trunks, which have accumulated sufficient moss and decaying matter for the germination of the seedling. The seed would probably have been carried to such positions either by birds or other small animals. *Stems* branched from the base up to about 45 cm. long, 3.5—4 cm. diameter becoming leafless below with age and transversely ringed by leaf-scars at intervals of .5—1.2 cm. with a tuft of about 15 leaves at the apex. *Leaves* dark green, lorate, distichous but the blades spreading somewhat spirally, usually about 30—40 cm. long and 3 cm. broad, but may be up to 90 cm. long and 5 cm. broad, widening very gradually from the base for about 2/3 its length and thence narrowed gradually to the apex. *Peduncle* compressed, sharply 2-edged, unequally convex on the surfaces, about 30 cm. long, 1.5 cm. broad at the base narrowed to 1 cm. under the umbel. *Spathe-valves* 4, membranous, unequal, more or less lanceolate, 4 cm. long. *Umbel* about 15-flowered. *Pedicels* 1.5—3.5 cm. long. Perianth deep salmon, with the lobes green tipped, yellow on the overlapped margins, 3.5 cm. long, with a tube 4—5 mm. long and lobes slightly spreading at the tips; the outer lobes

elliptic to spatulate-oblong, 7 mm. broad; the inner lobes 1—1.2 cm. broad. *Stamens* about equalling the perianth lobes in length, inserted at the throat of the perianth tube and the base of the filaments projecting over the mouth of the tube and fitting closely round the style. *Ovary* about 5 mm. long; style extending about the same distance as the anthers. *Fruit* a berry, subglobose, about 1.5 cm. in diameter.

Cryptostephanus vansonii Verdoorn, Herbertia Plate 316, fig. 4 and 4a (F. P. S. A. plate 885). When the plants of this species from Southern Rhodesia were first seen at the National Herbarium, Pretoria, they were not in flower and, on vegetative characters, appeared almost certainly to belong to the genus *Clivia*. This assumption was proved quite wrong when the plants flowered later. The perianth contained a corona in the throat and the stamens were inserted in two series. As at that time constituted, the genus *Cryptostephanus* consisted only of the type species, *C. haemanthoides* Pax, from Angola, so the addition of a second species from a remote station was of more than passing interest. Miss Verdoorn drew attention in her account to the similarity of her species to species of *Tulbaghia*, which also have a corona and stamens inserted in two series, but the barrier of the superior ovary of the latter is a vital distinction. *Rootstock* subglobose, tunicated, about 10 cm. long and 2.5 cm. diameter, for the most part above ground; roots cylindric, 5 mm. diameter, creeping near soil surface and partially above ground. *Leaves* 12 to 18, distichous at base, spreading above, lorate, up to 60 cm. long and 2.5 cm. broad, slightly narrowing towards base and apex, spreading recurved. *Peduncle* about 20 cm. long, strongly compressed, ancipitous. *Spathe-valves* several, unequal, withered. *Pedicels* green, terete, up to 3 cm long. *Flowers* about 30 in an umbel, white tinged with pink about the throat, the basal portion surrounding the ovary and partly fused with its walls, greenish; perianth-tube from above ovary 7 mm. long; segments about 8 mm. long, spreading; the three outer slightly narrower than the three inner and with more obviously hooded apices. *Corona-lobes* 6, bifid, each lobe inserted at the base of a perianth-segment, yellow or pink, about 3.5 mm. long. *Anthers* in 2 rows, inserted in the tube; the 3 lower subsessile; 3 upper with filaments less than 1 mm. long. *Ovary* 3-chambered, ovules 2 to 4 in each chamber; style columnar, 3 mm. long.

Crinum buphanoides Welwitsch was figured on plate 887 of "Flowering Plants of South Africa" 1943. This plant differs quite appreciably from all other species of the genus recorded from Southern Africa in its very slender perianth tube and slender spreading segments. In these characters it is allied to a number of species from Tropical Africa belonging to the section *Stenaster*.

Volume 24 of "Flowering Plants of South Africa" contained only *Tulbagia ludwigiana* Harv. (plate 935) while *T. natalensis* Baker appears in Vol. 25 on plate 979. There is nothing outstanding about these species, but they give an opportunity of drawing attention to the fact that the rootstock of the genus *Tulbaghia* has been variously described as a "rhizone," "tuberous," "corm," "bulb," and "not bulbous." The rootstock in most species grows erect in the ground, is unbranched or

South African amaryllids— 1. **Cyrtanthus affinis** R. A. Dyer. 2. **Cyrtanthus speciosus** R. A. Dyer. 3. **Clivia caulescens** R. A. Dyer. 4. **Cryptostephanus vansonii** Verdoorn; 4a. same, portion of perigone showing paraperigone (corona) lobes and stamens in two series.
Plate 316

branched, and often the leaves die down in winter, leaving the slightly fleshy leaf bases crowning the apex of the semipersistent, variously enlarged stem. The stem dies back very gradually with age and new roots are produced from its side, slightly below the base of the leaves. The storage capacity of the leaf-bases (rudimentary bulb) as compared with that of the old stem varies in different species.

Cybistetes Longifolia (L). Milne-Redhead and Schweickerdt, which was so thoroughly reported in Journ. Linn. Soc. (Bot.) 52: 192 (1939) completes Volume 25 on plate 1000. It was stated there that the close similarity in the leaf characters of *Cybistetes longifolia* and *Ammocharis coranica* is undoubtedly responsible for much of the confusion between the two plants. In their spreading, distichous, biflabellate arrangement, in the dying back from the tip and the lengthening again by further growth from the base in general appearance the leaves are remarkably alike. While the former is restricted to a small area of the South-Western Cape, the latter, though not in that area, extends throughout the rest of South Africa and into adjacent parts of Tropical Africa. Thus there is no possibility of comparing the two plants together in the wild.

After Vol. 25 the publication "Flowering Plants of South Africa" was given the shorter title "Flowering Plants of Africa" (F. P. A.) in order to develop the Pan African ideal in botanical exploration and research. This volume, which completes the series to-date, contains only one species of *Amaryllidaceae*. It is *Gethyllis linearis* L. Bolus. It will do no harm to draw attention once again to the unusual habit of this endemic genus. The leaves are produced after the winter rains begin at the Cape, and disappear or nearly so, by the time the flowers make a very brief appearance during summer. The perianth is long and slender and extends underground to the bulb and it is only in autumn or early winter that the maturing fruits come above ground. There are frequent references to *Gethyllis* in old books on botanical exploration of the Cape Province, since the fruits were much prized. Most of them have a pleasant fruity aroma, and an alcoholic infusion from them was used ostensibly as a remedy for digestive troubles.

"Flowering Plants of Africa" is not the only scientific publication in South Africa in which we find new descriptions and information about *Amaryllidaceae*. There have been several items of recent years in the "Journal of South African Botany", edited by Professor R. H. Compton, Director of the National Botanic Gardens, Kirstenbosch (Cape Town), near the southern extremity of the Union, 999 miles from Pretoria by rail.

In "Journ. S. A. Bot." 10: 1944, Miss Barker described *Hessea chaplinii* and *Strumaria salteri* for the first time. Neither is very large but the latter, as the author points out, has a charming inflorescence of pink flowers. The type specimen, collected by Paymaster Captain T. M. Salter, R. N. (retired) came from Pakhuis Pass in the Clanwillian Division of the Cape Province. The former species is quite small and apparently rare, being recorded only from the Malmsbury Division of the

Cape Province. It is apparently closely related to *Hessea gemmata* Benth.

Two more undescribed species of *Agapanthus* were recorded by F. M. Leighton (Mrs. Isaac) in "Journ. S. A. Bot." 1945, but except to say they are among the smallest in the genus, *A. patens* focussed in the mountains of Basutoland and *A. gracilis* from Zululand, no further details will be given here. Mrs. Isaac's research on the genus has been temporarily interrupted, but it is hoped that she will soon be able to continue and bring up to date her account of the genus in a unified effort.

These, together with a new species of *Boophone, B. haemanthoides,* Leighton (Journ. S. A. Bot. 13: 59, 1947), are the chief new records, but there is one more reference which is of particular interest. Dr. Barnard, in "Journ. S. A. Bot." 13: 1 (1947), gives a description of the *Codex Witsenii* in the South African Museum, Cape Town. It concerns the Governor Simon van der Stel's Expedition to Namaqualand 1685-6. The Expedition numbered among its personnel a talented artist who made good paintings of numerous subjects of biological interest. Among the paintings was one of a flowering bulb of a species of *Brunsvigia.* Taking the field notes into consideration, botanists at the Cape arrived at the conclusion that it was probably *B. appendiculata* Leighton. The van der Stel record languished only 260 years without a name.

And this reference to *Brunsvigia* serves to say that the present author is busy on a taxonomic study of the genus as a whole.

STANFORD'S CULTURE OF SOUTH AFRICAN BULBS

As we go to press, the welcome news was received through Mr. Bruce Hinman, Geneva, Illinois, that the publication of Miss K. C. Stanford's long delayed book on the culture of South Africa bulbs is now definitely set for this winter (1948-1949). The publishers are Messrs. Maskew Miller, Adderley Street, Cape Town, South Africa.

We feel that it is particularly appropriate to announce this book in the 2nd South African Edition of Herbertia. We have all been looking forward to the appearance of this book, and feel that it will add greatly to the appreciation of South African bulbous plants, including many beautiful amaryllids.—Editor.

TRAUB & MOLDENKE'S "AMARYLLIDACEAE: TRIBE AMARYLLEAE" [1]

This is a taxonomic treatise on the Tribe *Amarylleae* of the *Amaryllidaceae,* including the seven genera, *Lepidopharynx, Worsleya, Amaryllis* Linn., *Placea, Griffinia, Ungernia* and *Lycoris.* It includes the detailed descriptions of the species, and if required their grouping into subgenera, under each genus, and the arrangement of the genera under three subtribes.

The three original illustrations of *Amaryllis belladonna* Linn., by Hermann (1698). Merian (1705) and Seba (1734), cited by Linnaeus in "Species Plantarum", 1753, that definitely decide the identity of this species, and illustrations of *Brunsvigia rosea* (Lamarck) Hann., by Ferrari (1633) and Barrelier (1714), the species omitted from "Species Plantarum", 1753, are reproduced. There are also illustrations of *Lepidopharynx deflexa, Worsleya Rayneri, Amaryllis advena, Amaryllis bicolor, Amaryllis elegans, Amaryllis Leopoldii, Placea ornata, Griffinia hyacinthina, Ungernia Sewerzowii, Lycoris Sprengeri, Lycoris incarnata, Lycoris sanguinea, Lycoris radiata* and *Lycoris aurea.*

Although the subject is no longer an academic one since the publication of Uphof's researches (1938, 1940), it is of interest to note that the book also includes. for the sake of completeness, the following important work on nomenclature:—Detailed proofs are presented (a) for the typification of the Linnean species, *Amaryllis belladonna* Linn. 1753 (= the American Belladonna), and the non-Linnean species, *Amaryllis rosea* Lamarck, 1783 (= the Cape Belladonna); and (b) for the typification of the genus *Amaryllis* Linn. 1753 (syn.—*Hippeastrum* Herb. 1821) by Herbert in 1819, and the valid publication of *Coburgia* Herb. 1819 (syn. —*Amaryllis* Herb. 1821, non Linn.). Under the International Rules of Botanical Nomenclature, therefore, (a) on the species level, the epithet "*Belladonna*" is permanently attached to the American Belladonna, and the epithet "*rosea*" can never be separated from the Cape Belladonna; and (b) on the generic level, the name *Amaryllis* Linn. 1753 (syn.—*Hippeastrum* Herb. 1821) must be retained for the American group, and the name *Coburgia* Herb. 1819 (syn.—*Amaryllis* Herb. 1821, non Linn.) applies to the Cape Belladonna. These conclusions are in essential agreement with those previously arrived at by Stapf (1929) and Uphof (1938, 1940, 1948). However, because there are only slight morphological differences between *Coburgia* Herb. (1819), and fertile hybrids can be obtained on crossing the Cape plant with typical species of the genus *Brunsvigia* Heist., Hannibal (1944) had reduced *Coburgia* Herb. (1819), under the synonym, *Callicore* Link, to the synonomy of *Brunsvigia* Heist., and this disposition is accepted by the authors. The typification of the Linnean genus *Amaryllis* Linn., is in harmony with the proposal of Hitchcock (1929), and conservation of any of the affected genera is ruled

[1] **"Amaryllidaceae: Tribe Amarylleae"** by Hamilton P. Traub and Harold N. Moldenke. The American Plant Life Society, Box 2398, Stanford, Calif. Manila covers; 194 pages; $4.00, postpaid.

out because it is shown that the case of Linnean genera is already provided for by Article 20 of the Rules, and in addition, more problems would be created than could be solved by such a procedure.

Authors' summary.

NOTES ON AMARYLLIDS IN THE HOLY LAND

Capt. W. F. W. Harding, *England*

(This article was received too late for inclusion in Herbertia, volume 14, 1947 along with the one by Mr. Hardy.—Ed.)

The illustration (Figure 187) of *Vagaria parviflora* shows a specimen

Fig. 187. *Vagaria parviflora* as it grows in its native habitat in Palestine. Photo by W. F. W. Harding.

growing wild on the rocky but afforested (Pine species) slopes in Palestine at Bab el Wad at the gate to the pass into the hills to Jerusalem. The photograph was taken on September 16. Poor rock crevices on dry

hillsides are its favorite haunt, and the bulbs cling very tenaciously to the sides of the crevices in which they grow, about 6 to 9 inches below the surface of the soil. The flower scape is about as tall as those of *Pancratium maritimum* but is more slender and the flowers are only about one-third the size of that species. There is no scent. The parandroecium (staminal cup) is deeply divided.

Fig. 188. *Pancratium maritimum* as it grows in its native habitat in Palestine. Photo by Capt. W. F. W. Harding.

Figure 188 shows a specimen of *Pancratium maritimum* taken on September 14 at Gaza in Palestine on the seaward slopes of the sand dunes that fringe the beach. This seems to be a true marine plant for we found it confined to the dunes that stretch along the coast. The dune sand seems to furnish all of the nourishment that it needs. It is a thing of real beauty and its flowers, bourne in an umbel of three to ten on the top of a foot high scape, reminded one superficially of a mixture of a large trumpet daffodil and a Madonna *Lilium*. The perfume is exquisite. The color as in the case of *Vagaria,* is pure white, and again in both cases the leaves succeed the flowers.

CHROMOSOME NUMBERS IN **AMARYLLIS** LINN.

Dr. Ernesto De Miranda Neto, *Agronomist,*
Rio de Janeiro, Brasil

This is a translation of the writer's article (Neto, 1945) published a few years ago. Since this was published, the writer has accepted the correct nomenclature, *Amaryllis* Linn. (1753), (syn.—*Hippeastrum* Herb., 1821) for the American group in accord with Uphof's contributions in Herbertia 5: 101—109, plates 107 & 108. 1938; Herbertia 6 (1939): 163—166. 1940; and Herbertia 13 (1946): 97—98. 1948; and also the disposition of the Cape Belladonna, *Brunsvigia rosea* (Lamarck) Hannibal, as set forth in Herbertia 9 (1942): 101—102, 146. 1943.

The plants belonging to the genus *Amaryllis* Linn., are frequently found in Brasilian gardens where they are greatly admired and appreciated for their outstanding beautiful flowers. They are also characterized by iridescence of the tepalsegs, and the flowers of some species are delightfully fragrant.

Since Johnson in 1799 produced the first hybrid *Amaryllis* in England, many others have been introduced. Herbert raised thirty-five hybrid *Amaryllis* from 1811 to 1824. From 1830 to 1880 great advances were made in this field by the English firms of Ker and Veitch. In 1928, at the 15th Annual Exhibition sponsored by the United States Department of Agriculture, 1200 specimens of hybrid *Amaryllis* were shown, all distinct.

Heitz (1926) and Inariyama (1937) were the first to investigate the karyology of *Amaryllis* Linn.

Heitz (1926) studied the karyology of *Amaryllis striata* Lamarck var. *fulgida* (Ker-Gawler) Traub & Moldenke (syn.—*Hippeastrum rutilum* var. *fulgidum*), and he reported 2n = 24 or 22 for this variety. His technique consisted of boiling the root-tips in a solution of aceticcarmine and then crushing them with a needle. This was good work if the date of these experiments is taken into consideration. He did not publish a drawing of the chromosomes.

Inariyama (1937) determined the chromosome complement of one *Amaryllis* species and one hybrid.

Amaryllis vittata L'Hérit. (syn.—*Hippeastrum vittatum* Herb.), 2n = 44

In the diploid complement, the chromosomes are of varying lengths. The constriction is submedian in about 8, subterminal in 28, and quite subterminal or terminal in the rest of the chromosomes. Although an exact study of the chromosome morphology has not been made, the somatic number suggests that the plant is tetraploid with n = 11 as the basic number, as shown in Plate 316a, fig. 1. Nagao and Takusagawa (1932) have reported 2n = 46 for this species, a number which is not exactly four times the basic number, n = 11.

Amaryllis hybrida, 2n = 44

Generally speaking, the somatic chromosome complement of this particular hybrid *Amaryllis* studied by Inariyama (1937) greatly resembles that of *Amaryllis vittata,* as shown in Plate 316a, fig. 2.

MATERIALS AND METHODS

In the case of the present researches, the chromosome complements of three *Amaryllis* species were determined. The material studied was furnished by Professor Honorio da Costa de Monteiro Filho, Botanical Garden of Rio de Janeiro, and by our colleague Helmut Hamacher. The bulbs were grown in soil, and the root-tips, about 5 mm. long, were fixed in Navashin's modified solution, in the following proportions:

Solution A.	Distilled water	70 ml.
	Formalin	30 ml.
Solution B.	Distilled water	92 ml.
	Chromic acid	1 gm.
	Glacial acetic acid	7 ml.
Solution C.	Osmic acid	1% solution

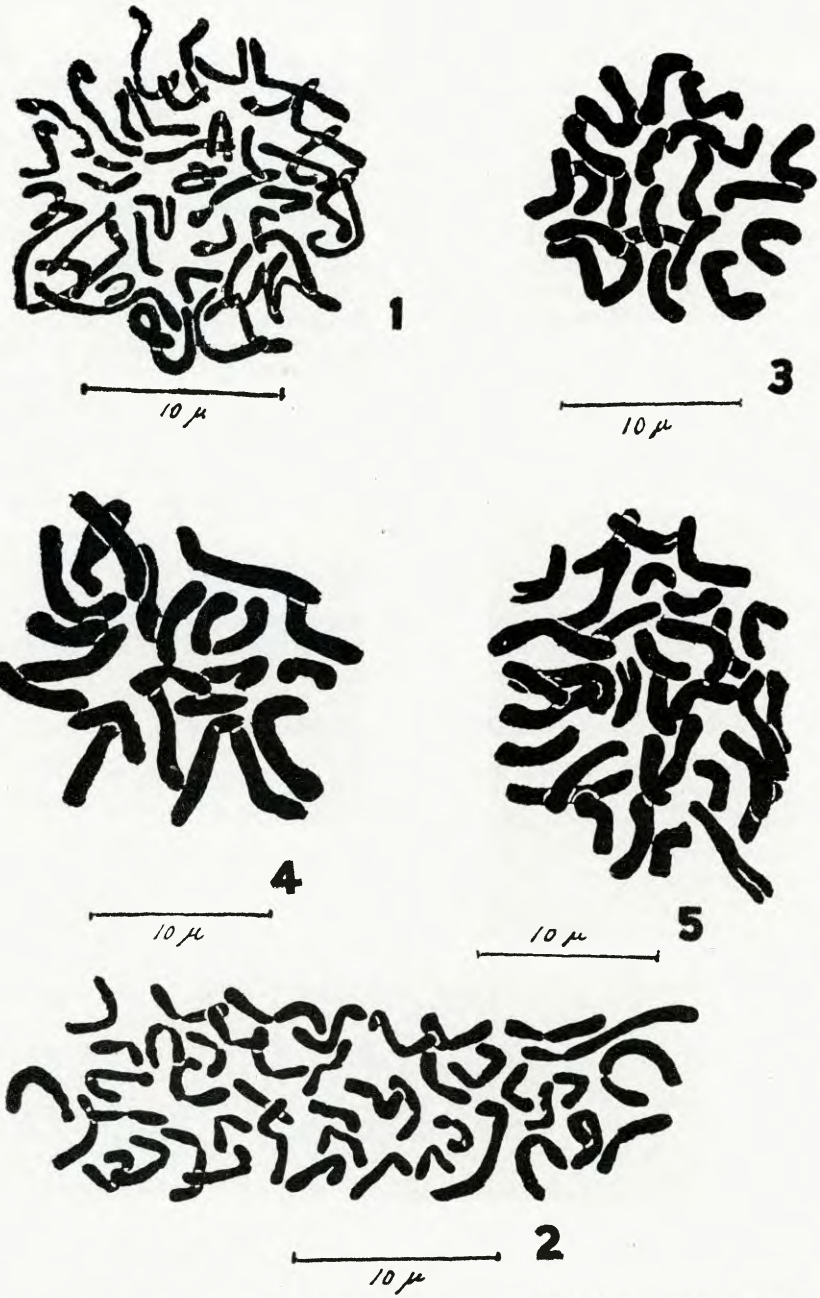
Equal quantities of solutions A & B were mixed immediately before using. Solution C was added at the rate of 1 drop for each milliliter of the A and B mixture.

The material was fixed for four hours, and it was then washed in running water for eight hours. It was then dehydrated by an ethanol series, and followed by a gradual series of ethanol-xylol until pure xylol was reached. The material was then imbedded in paraffin (52° C., M. P.), the oven being regulated at 60° C.

The material was cut to a thickness of 12 microns with a Minot type microtome. Previous study of longi-sections had shown that the size of the cells of the root-tip growth zone varied from 18 to 20 microns.

The sections were placed on slides that had been thinly coated with Mayer's albumen, and were heated at a temperature of 40° C. Paraffin was removed in a series of xylol, xylol-ethanol mixtures until 35% ethanol was reached, allowing 5 minutes in each mixture in the series. The sections, attached to the slides, were then washed in distilled water for 5 minutes, and put in a solution of 4% ferric ammonium sulfate ("iron-alum") for four hours. They were then removed, washed and placed in Heidenhain's iron-haematoxylin for four hours. The sections were differentiated under the microscope in "iron-alum" at 2%. Finally, the sections were dehydrated, beginning with ethanol 35% and ending with pure xylol, and were then mounted in Canada balsam.

Many slides were prepared, and studied under the compound microscope. The chromosomes were observed as somatic metaphases, and were drawn by means of a Zeiss Camera lucida (Abbe type), as shown in Plate 316a, figs. 3, 4 & 5.



Chromosome numbers in **Amaryllis** Linn.—1. **Amaryllis vittata;** 2. **Amaryllis hybrida;** 3. **Amaryllis calyptrata;** 4. **Amaryllis stylosa;** and 5. **Amaryllis Reginae.** 1 and 2 reproduced from Inariyama (1937); 3, 4 and 5 original.
Plate 316a

DETERMINATION OF CHROMOSOME NUMBERS

The three species of *Amaryllis* Linn., included in the study were: *Amaryllis Reginae* Linn., *Amaryllis stylosa* Sweet, and *Amaryllis calyptrata* Ker-Gawler.

Amaryllis calyptrata Ker-Gawler; 2n = 22

The somatic complement includes chromosomes of various sizes, the ones of medium and small size outnumbering those of double the size of the small ones. The large ones appear to have terminal or subterminal constrictions, and they appear to be of two pairs. We could not determine their number according to the constrictions.

It was concluded that this species had double the basic n = 11, or 2n = 22 chromosomes, as shown in Plate 316a, fig. 3.

Amaryllis stylosa Sweet; 2n = 22

The chromosome complement of this species is similar to that of *Amaryllis calyptrata,* but the chromosomes appear to be a little smaller, as shown in Plate 316a, fig. 4.

Amaryllis Reginae Linn.; 2n = 33

The chromosome complement of this species is similar to those of the two preceding species, except that it is a triploid as shown in Plate 316a, fig. 5.

DISCUSSION AND CONCLUSIONS

Heitz (1926) had concluded that the basic chromosome number in *Amaryllis* Linn., was n = 11 or 12. Inariyama (1937) later definitely established the basic number for this genus as n = 11. This is in harmony with the results presented in this paper which has established the numbers 2n = 22 for *Amaryllis stylosa* and *Amaryllis calyptrata,* and 2n = 33 for *Amaryllis Reginae.*

Inariyama (1937) has observed natural hybrids in *Lycoris,* and apparently this is also true in *Amaryllis* Linn., with particular reference to *Amaryllis Reginae.* This species is commonly found in the mountains surrounding Rio de Janeiro (Federal District), and in the sand banks of the "Baixada Fluminense" (low region in Rio de Janeiro State). Prof. Honorio C. Monteiro de Filho had observed that *Amaryllis Reginae* was sterile and this led to the study of the chromosome complement in this species. From the data available, it appears that *Amaryllis Reginae* is a natural hybrid between a species having 2n = 22, and a second with 2n = 44. This hypothesis is plausible because in addition to the 2n = 22 species studied, there are a number of other species, varieties and forms in the same geographical range—*Amaryllis ambigua* Sweet (= *Amaryllis elegans* Sprengel var. *ambigua*), *Amaryllis breviflora* (Herb.) Traub & Uphof, *Amaryllis Gardneri* Seub. (= *Amaryllis organensis* (Hook.) Traub & Uphof), *Amaryllis aulica* Ker-Gawler, *Amaryllis miniata* Sims

(= *Amaryllis striata* Lamarck var. *fulgida), Amaryllis glaucescens* Mart. (= *Amaryllis striata* Lamarck), and other varieties of *Amaryllis striata* Lamarck. Among these there may be one or more with 2n = 44. Our colleague Helmut Hamacher has promised to continue these studies in order to test the proposed hypothesis.

ACKNOWLEDGEMENTS

The work reported was completed in major part while the writer was a student in the Escola Nacional de Agronomia. He is grateful to Professor Honorio Monteiro de Filho for advice and help graciously given. He is also indebted to Professor Verlande Duarte Silveira, and Professor Carlos Lacerda for laboratory facilities graciously extended, and to Francisco Amaden for help in the preparation of the material.

REFERENCES

Figueiredo, E. R. Lirios e *Amarillis*. Ed. Chacaras e Quintais.

Heitz, E. (1926). Der Nachweis der Chromosomen. Zeit. Bot. 18: 625—681.

Hannibal, L. S. (1943). *Callicore* and *Brunsvigia*. Herbertia 9 (1942): 101—102, 146.

Inariyama, S. (1937). Karyotype studies in *Amaryllidaceae* I. Sci. Rep. Tokyo Bunrika Daigatu Sec. B, no. 52. Vol. 3, pp. 95—113.

Monteiro de Filho, Honorio da Costa. (1937). Os lirios do gênero *Hippeastrum*. Chave para classificação. Rev. Soc. Brasileira de Agronomia 5: 1—105.

Neto, E. de Miranda. (1945). Número de chromossomos no gênero *Hippeastrum* Herb. Bol. Soc. Bras. Agron. 8: 383—388.

Taylor, N. et al. (1936). The garden dictionary—the practical encyclopedia of gardening.

Traub, H. P. and C. J. Th. Uphof. (1938). Tentative Revision of the genus *Amaryllis* (Linn. ex parte) Uphof (syn.—*Hippeastrum* Herb.). Herbertia 5: 114—131.

———————————. (1940). Further Revision of the genus *Amaryllis* (Linn. ex parte), (syn.—*Hippeastrum* Herb.). Herbertia 6 (1939): 146—154.

Uphof, J. C. Th. (1938). The history of nomenclature—*Amaryllis* Linn., and *Hippeastrum* Herb. Herbertia 5: 101—109, plates 107 & 108.

———————— (1940). Critical Review of Sealy's "*Amaryllis* and *Hippeastrum.*" Herbertia 6 (1939): 163—166.

————————. (1948). Linnaeus confirms Dr. Hill's identification of *Amaryllis belladonna* Linn. Herbertia 13 (1946): 97—98.

POSTSCRIPTS

POSTSCRIPT.—Our colleague, Dr. Moldenke, and Mrs. Moldenke, delegates representing the New York Botanical Garden at the recent Latin American Botanical Congress, are also on tour. Letters have been received from Dr. Moldenke while in Brazil, Argentina, Venezuela and Chile.

Under date of October 29, from Santiago, Chile, Dr. Moldenke writes, "In northern Argentina I saw amaryllis everywhere. . . . . On a mountain outside of Tusumán we passed (in our chartered bus) a meadow of green grass and great colonies of *Amaryllis* in full bloom. There must have been 75 or 100 plants in bloom in a meadow not more than 100 feet square. . . . . On the top of the mountain one of our group came to me with a bouquet of . . . . . probably 40 stalks, each with 3 or 4 flowers open . . . . . collected a short distance away. . . . . The flowers were deep red, while those part way up the mountain were light red or pink. . . . . All over here in South America we find the plants cultivated . . . . . local botanists assure me that they are usually wild plants transplanted to the gardens."

Under date of October 30, he writes, "Santiago . . . . . Today we went with Drs. Looser, Kausel and Gravdjot on a grand hike up one of the Andes Mountains near here, called Quebrada Ramon. The scenery was grand. At 1000 m., we found *Placea Arzae* in flower."

November 3, 1948 —*Hamilton P. Traub*

POSTSCRIPT.—Due to the long delay in the publication of HERBERTIA, Vol. 15, it is possible to report the receipt of GENTES HERBARUM Vol. 8, fasc. 1, May 1949. It contains the news that the correct nomenclature, *Amaryllis belladonna* Linn., and *Brunsvigia rosea* (Lam.) Hann., has been accepted for inclusion in the forthcoming revised edition of the HANDBOOK OF CULTIVATED PLANTS, edited by Dr. L. H. Bailey, of the Bailey Hortorium, Cornell University, Ithaca, New York.

1. SPECIOLOGY

[EVOLUTION, DESCRIPTION, CLASSIFICATION AND PHYLOGENY]

CRINUM OCCIDUALE

R. A. Dyer

Crinum occiduale R. A. Dyer, **sp. nov.**, Plate 317.
affinis *C. rautaneniano* Schinz ex descr., floribus paucioribus minoribus perianthii segmentibus dorso rubro suffusis differt.

Bulbus globosus, circiter 5 cm. diametro, in collum breviter productus. *Folia* plus minusve 10, 40—45 cm. longa, 1.5—1.8 cm. lata, canaliculata, patentia, leviter glauca, marginibus minute serratis. *Pedunclus* plus minusve 25 cm. longus, circiter 1 cm. latus, leviter compressus et glaucus. *Flores* 3—4. *Pedicelli* usque 1.5 cm. longi. *Perianthium* 16—17 cm. longum, tubo circiter 9 cm. longo angusto cylindico curvato, lobis lanceolatis 7—8 cm. longis recurvus dorso rubro suffusis, exterioribus 1.5—1.7 cm. latis, interioribus circiter 2 cm. latis, genitalibus declinatis perianthio leviter brevioribus. *Stylus* leviter exsertus; stigma breviter trilobata. Plate 317.

Distribution:—South West Africa, without exact locality and no record of collector, (communicated by *W. M. James)* in National Herbarium, Pretoria, No. 28308.

Bulb globose, about 5 cm. in diameter covered by a thin membranous tunic and produced into a short neck. *Leaves* up to about 12, sheathing at the base and shortly continuing the neck of the bulb above ground, the outermost leaves spreading, canaliculate, 40—45 cm. long, 1.5—1.8 cm. broad when flattened, tapering to the apex, the inner leaves progressively smaller in all respects, withering eventually from the tips, slightly glaucous, minutely serrate on the margins. *Peduncle* produced laterally, up to about 25 cm. tall, slightly compressed, 1 cm. in the greater diameter, slightly glaucous. *Umbel* 3—4-flowered, subtended by 2 ovate-lanceolate bracts. *Pedicels* up to 1.5 cm. long. *Ovary* about 1 cm. long. *Perianth* white with a pink stripe down the back of the segments, 16—17 cm. long; tube slender, 9 cm. long, slightly curved and expanding gradually to the throat; segments 7—8 cm. long, recurved in the upper half, the outer 1.5—1.7 cm. broad and cuspidate at apex, the inner 1.9—2 cm. broad. *Stamens* inserted in the throat of the perianth, unequal in length and slightly shorter than the perianth segments; anthers linear, pink, 1.5 cm. long (before dehiscence), black, much contracted and crescent shaped with age. *Style* slender, exserted slightly beyond the filaments; stigma subcapitate and shortly 3-lobed. Plate 317.

The specific epithet indicates its western origin in Southern Africa.

The description of this species is overdue, since it has already come into prominence in cultivation through the activities of Mr. W. M. James.

Evidence of this is to be found in HERBERTIA 8: 43 (1941) 1942. One of the bulbs, originally from South West Africa, was forwarded to me for identification by Mr. James in 1937. The accompanying figure is from a photograph taken when the plant first flowered here in 1939, and differs very little from the inflorescence produced in December-January, 1947-48. It compares closely also with the illustration in the note by Mr. James.

Efforts to identify the plant positively with an established species have failed, and unfortunately efforts to localise it in the wild state in South West Africa failed also. However, the increased publicity it will now receive through the pages of HERBERTIA may result in further information becoming available.

Judging from the type description of *C. rautanenianum* Schinz, from Amboland (which is a northern strip of South West Africa), this species is the nearest relative to our plant. Judging also from Baker's account in Fl. Trop. Afr. 7:402 (1898), it seems that *C. rautanenianum* has somewhat larger umbels and flowers, the latter being white without a pink stripe down the back of the segments and the segments are apparently broader and more contracted to the base than in *C. occiduale*.

Mr. James makes mention of his observations on pollen dehiscence. As far as my limited experience with *Crinum* goes, it is not exceptional for the pollen to begin falling shortly prior to the normal opening of the bud in the late afternoon and dehiscence is mainly complete before the following morning. The rapid shrivelling of the anthers on dehiscence makes it important to state in descriptions whether measurements of anthers are made before or after dehiscence. The colour and shape of anthers before and after dehiscence are characters of specific importance in certain cases.

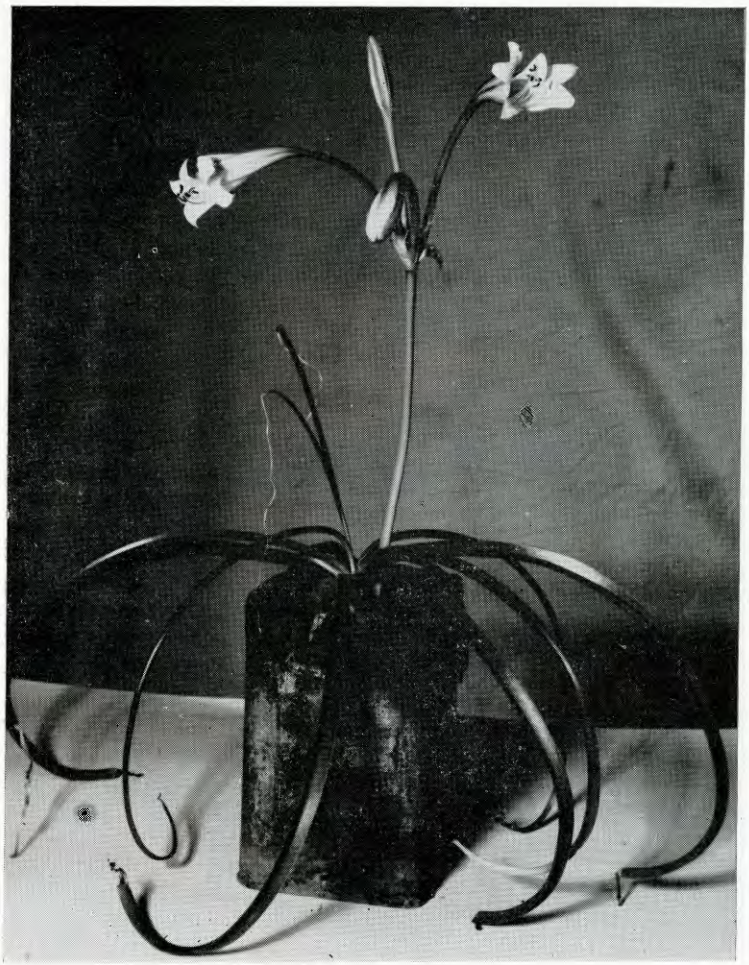
A study of the South African species of *Crinum* is in progress at the National Herbarium, Pretoria, by Miss Verdoorn. As so frequently happens, this project is seriously hampered by imperfect early records and the tangled state of the nomenclature. In the present study too, administrative and other duties cause long and recurring interruptions, nevertheless it is hoped to bring greater order into the genus in South Africa before long.

NORTHERN NEW YORK DAYLILY EVALUATIONS

STANLEY E. SAXTON, *New York*

During the past year my daylily plantings have greatly expanded. At Saratoga Springs, N. Y., there are now three large gardens in different locations. At Mount Arab, in the northern Adirondacks, I now have two different gardens. Almost all of the new daylilies are represented in these gardens, and while I could not see every garden each day, frequent trips between them gave me a well rounded picture of the daylily display.

In this resumé I may mention certain varieties which were favorites with me. This does not indicate that I think these should be rated the



Crinum occiduale R. A. Dyer, *sp. nov.*

Photo by H. King

plate 317

best in their particular sections. Indeed I believe there is room in the garden world for plants of similar character if at the same time they also have some contrasting growth factor which admits of differing garden effects. I should like to illustrate this point with a discussion of three rose toned daylilies.

Rose Gem (Stout), Martha Washington (Wheeler), and my own Myrna all gave me good performance this summer. Rose Gem and Martha Washington are very nearly the same color,—a bright old rose; Myrna (Figure 189) is a bit deeper in tone. Rose Gem was the tallest of the three, almost four feet. The flower was also the largest, graceful in a somewhat loose petaled effect, with good stem branching and about 25 blooms per stalk. The stems with me were somewhat arching and required staking. Rose Gem is definitely a background plant but bold and showy. Martha Washington was the shortest, about thirty inches tall, a much trimmer flower, more symmetrical and the tepalsegs wider in proportion to the size of the flower which is about four inches. I have observed as many as sixty-six buds on one stem of Martha Washington which is quite definitely a multiflora type. This is a foreground plant. Myrna is in between these two in both height and size of flower. The flower has broad tepalsegs but is differently shaped than the other two. The stems are somewhat arching but do not need staking. Each of these flowers is very lovely, and although the color is similar each fills a different place in the scheme of the flower border.

In the deep purple-red and wine tones my garden had fine bloom on Persian Princess and Purple Finch (Nesmith); Royal Lady and Sabrina (Wheeler); San Juan (Traub); and Royal Beauty (Taylor). Persian Princess and Royal Beauty were the darkest colors, both robust plants with large well formed flowers. Persian Princess is a more velvety color and gave an impression of greater color depth, while Royal Beauty had a satiny sheen and more blue in the color tone. Purple Finch and Royal Lady had the luminous red-purple which one associates with pansy purple. The flowers of Purple Finch seemed small for the height of the stem while the lower stalk of Royal Lady balanced its medium size flowers nicely. The latter was almost a self as it bloomed for me this summer but its form is very different and dainty.

San Juan is a claret-red, tall with medium size flowers but extremely brilliant and with excellent branching. Sabrina shows bronzy tones mixed with the maroon-purple base and is influenced from day to day according to the degree of heat and amount of moisture, sometimes being almost pure bronze.

The above were my favorites in the deeper shades but I should also mention Wolof (Stout), which bloomed very late for me in August and September, and Duncan (Wheeler) which seems a larger and earlier Vulcan.

There are a few fine daylilies which fall into the so-called 'mahogany' range. Brackel (Wheeler) is the showiest, its large flowers being broadly marked with garnet on a mahogany-brown background. Also its tone changes from day to day—some days it is almost a tan with

brown markings. A flower I found to be most consistent both in Saratoga Springs and Mt. Arab was Dr. Traub's Granada. It is a very rich velvety mahogany.

True pinks are still hard to find. Qualifications must be added to the descriptions of these. I am very fond of Bertrand Farr (Stout) and

Fig. 189. Hybrid Daylily—Myrna. Photo by Stanley E. Saxton

Paul Ihrig (Wheeler) which I would call flesh or pastel pink. Georgia (Stout) probably falls in this class but it did not perform well in any of my gardens. I like Bertrand Farr much better. I have a flower from Mrs. Nesmith which I believe is Dresden China, a bi-tone with pastel pink petals, very wide and lightly recurved, and lighter sepsegs. The form is lovely and it is one of my favorites.

A shade deeper with more salmon in the pink are Piquant (Nesmith), tall and nicely formed although only medium in size; and Miss Houston (Russell) which I did not like as well although it is very similar to Piquant. There are many flowers in this shade now.

Pink Charm (Nesmith) is attractive for its beautifully recurved form and large size, but ochre-red describes the color much better than pink. Highland Chieftain (Nesmith) is a lavender-rose of most unusual shade. I have nothing else like it. Hazel Sawyer (Wheeler) and Dolly Varden (Nesmith) are a dusty pink of similar color tone, the latter being taller.

I have seen some real pink tones in seedlings but they will be rare for some time.

Orange-scarlet and scarlet-red shades, sometimes called raspberry, are stunning in the garden and real eye openers. Red Bird (Stout) should probably be the type flower for this color section. Scarlet Sunset (Wheeler) is a brilliantly glowing color, more orange than Red Bird. The tepalsegs are narrow and the form starlike with muchly recurved tepalsegs. I named two flowers in this color section this year, both with wide petepalsegs. Cotillion was the brightest flower in my garden as long as it was in bloom. Griselle is a raspberry toned flower. Matador (Nesmith) has these bright colors with a tall, well branched and imposing stalk. I wonder why Rajah (Stout) has not received more praise for its rich glowing color?

And the reds! What an array of bright colors. Sachem, Ohred Baronet, Wekiwa, Kanapaha, Berwyn, Royal Ruby and Ruby Supreme. All exciting in one way or another. Kanapaha (Watkins) was a lighter color than the others with me but a clear velvety red. Ruby Supreme (Wheeler) was the largest flower of all with a garnet shading in the red. Baronet (Stout), Berwyn (Traub) and Royal Ruby (Nesmith) were all about two feet tall but all very good velvety reds with Baronet the finest formed flower. Sachem (Stout) and Ohred (Wheeler) are taller and much alike in my garden. Dr. Stout's new early-flowering reds, Caprice and Blanche Hooker, were the first red-toned daylilies to open in my garden. In fact Caprice was the first of all. The color does not compare with the later red sorts, and both are low growing, but they have a place as contrast to the early yellows. I like Caprice the better.

The Sass yellows dominated this section in my garden in 1948. Hesperus gave a fine show with its wide candelaburm branching. Star of Gold was a very pure, large medium yellow while White Lady and Sunny West shared honors in pale yellow. Actually it seems to me that the daylilies nearest to white are not the light yellows but rather the buff or light flesh and cream flowers. Here Duchess of Windsor (Traub) and Easter Morn (Wheeler) stand out for wide rounded petepalsegs and fine form. Another very light flower which I like is Nesmith's China Seas.

Some very nice bicolors among my own seedlings have made me critical of this group. I like Mrs. Nesmith's Bold Courtier, which is large and bold in form, much better than her Gay Troubadour. Stout's

Festival has never grown or flowered well for me while Caballero I like very much. Wheeler's Bobolink grows well but has much shading on the sepsegs which detracts from the bicolor effect. On the other hand, his Empress, a near self in Florida, is the most contrasty purple and yellow bicolor I have in the garden. I have a few Wheeler seedlings in my test plot which are very lovely in bicolor and bi-tone patterns. My own Saratoga was named not primarily for the bicolor characteristic but rather for its fine form, large size and noble carriage.

If I have neglected to discuss some of the more worthy new varieties it is because I do not have them, have not seen them, or my plants have not fully acclimated themselves to my conditions. I know there are some lovely new orange daylilies around the corner and when I can grow them side by side I will try to compare them. I do want to say that my growing conditions are extremely trying and anything that will stand up and perform well here certainly has merit. Each year I hope to add the newest and best things so that I may better know what is really worthwhile and can, perhaps, help someone else—with growing conditions similar to mine—save much valuable time and energy in finding what will make his garden a more lovely place.

MY BEST DAYLILIES

GEORGE GILMER, *Virginia*

I have been growing *Hemerocallis* for over fifteen years. I see very little of them before 5:00 in the afternoon so any plant that fades is practically worthless to me. I like neat grounds so I am apt to get rid of any plant that has poor foliage.

My garden is about one hundred miles southwest of Washington, D. C. in the eastern foothills of the Blue Ridge. My soil is heavy clay to which I have added considerable humus. We generally have a fair amount of rain throughout the growing season. I try to water my small plants once a week in dry seasons. This is not to keep them alive but to make them grow better.

I have no plants of any kind for sale. I have grown well over three hundred of what I acquired as the best available varieties. About one hundred have been discontinued. Some twenty-five more will be dropped this year.

If you have a favorite not on my list just remember I do not even *hope* to get all of the good new ones. If some I rate "A" are surpassed by those in your garden, it may be because I have not seen your best varieties. Within the next ten years I think most of those rated "A" will be surpassed and many of them will be no longer worth growing. There is also a difference in performance of the same daylily in different climates and under different growing conditions. I rarely judge one until I have grown it for two or three years.

"A" means with me that the plant has no serious defect at any season and is unsurpassed by any I have in the same color blooming at

the same season. "B" generally means one that used to rate "A" but is now surpassed. Occasionally "B" means one with a defect. "T" means I must observe it as a more mature plant for a longer time before passing judgment. Illustration—I used to rate Gold Dust "A." It is now surpassed by Elizabeth and I have reduced it to "B."

A	*B*	*T*
Adventure (large flower of gold on tall stalks—vigorous)	Aladdin (poor foliage)	Adiago
Annis Victoria Russell (good yellow)	Afterglow (fades)	August Orange
August Pioneer (good, late)	Apricot (not a dependable bloomer)	Aurantiaca
Berwyn (excellent bright red later than most reds)	Autumn Prince (very late but otherwise poor)	Aztec Gold (should rate A in 1949)
Black Prince (dark red)	Bagdad	Baggette
Caballero (one of the best bicolors)	Baronet (not dependable)	Betty (think it will rate A in 1949, early)
Carl Betscher (largest very early)	Bertram H. Farr (good pink color but fades)	Bicolor
Carnival	Boutonnaire (small, fades)	Black Hills
Chengtu (late and different)	Cinnabar	B Ladham
Colonel Besley (good, late)	Circe	Blanche Hooker
Dauntless	Clarice (expect to discontinue)	Bold Commander
Dawn O' Day	Colleena	Bold Courtier
Doctor Stout (an orange blend, one of the best)	Corinne Robinson	Bright Eye
Dorothy McDade (good, late)	Dawn O' Day	California
Duchess of Windsor	Dominion (dull red)	Cheerio
Elizabeth (very early and good)	Elaine (nearly a fadeless pink)	Chrome Orange
Fire Red	El Capitan	Clarion (would be A clear pink if it did not fade and close early)
Fred Howard	Emberglow (nearly a fadeless pink)	Confucius
General MacArthur (no better red)	Evangeline	Damozel
George Kelso	Flava	Dawn Play
Georgia (excellent)	Fulva Maculata	Decoration
Golden Orchid	Festival	Debonair
Granada	Genevieve	Dorothy Dawn
Hankow (late)	Gold Dust (very early)	Dragon
Helen Wheeler (no real pink fades less)	Gold Empire	Ducat (expect it to rate A in 1949)
Inca Gold	Golden Fleece	Earlianna (should rate A in 1949)
Indian Chief	Honey Red Head	Early Bird
Lidice (brilliant orange)	Joy Russell	Enchantress
Massasoit (tallest, red)	Kwanso fl. pl.	Fantasia
Matador	Lamar Russell	Garden Lady
Mayor Starzynski	La Tulipe	Gay Troubador
	Linda	Grosbeak
	Lustrious	Havilah
	Majestic (almost A)	Helicon
	Malcolm Russell	Hesperides (should rate A in 1949)
	Midas	Hesperus
	Mikado	Isaac Newton
		Jessie Newhall
		John Blaser
		J. S. Gaynor
		Judge Orr
		Kanapaha
		Kinglet

A

(blooms over a long season)
Mexico
Mount Vernon
Mrs. B. F. Bonner
(good yellow)
Mykawa
(good dark red)
Patricia
(lovely yellow)
Pink Charm
Portia
(take this rating with grain of salt—my son's seedling)
Purple Waters
(not a blue purple but the best I have in purple)
Queen of Gonzales
Queen Wilhemina
Rajah
Rancho Diana
(small)
Reba Cooper
Revoloute
(excellent)
Rose Gem
(Wau Bun type)
Ruby Supreme
(excellent)
San Juan
(good red)
Santa Maria
(bicolor)
Stalwart
(old but good)
Sylvia
Symphony
Taruga
(light yellow with form of Wau Bun)
Theodore Mead
(orange with form of Wau Bun, fine)
Victory Montevideo
War Path
(good red)
Wau Bun
(fine)
Wekiwa
(red, lovely in evening sun)
Wolof

B

Mildred Orpet
Minnie
(would rate A if pigmentation not uncertain)
Miss Welder
Mount Vernon
Now Glory
Ophir
(for years one of the best)
Peony Red
(would rate A if held up better in late afternoon, very distinctive color)
Port
Princess
Queen of Monterey
Red Bird
(deteriorates some in late afternoon)
Rosalind
(wonderful pink color but fades some and poor foliage)
Royalty
(poor foliage)
Russell Wolfe
Sachem
(almost A)
Saturn
(poor foliage)
Serenade
Sonny
Soudan
Spitfire
(poor foliage)
Spring Delight
Sweetbriar
(good pink but fades some)
Tara
(good but fades some)
Tejas
(poor foliage)
Theron
(fades and poor foliage but good color in morning)
Vivosso
(almost A)
Vulcan
(fades and curls in late afternoon)

T

Luna Goddess
Manchu
(fades)
Margaret
Margaret Palmer
Margaret Stuntz
Meteor
Mexia
Mignon
(small)
Mission Bells
Miss Jennie
Modesty
Monterey
Mrs. John J. Tigert
(expect to rate A in 1949)
Mrs. Jones
Musette
Ningpo
Ortencia
Paladin
Pasgagoula
Pheonecia
Pierre Sue
Play Time
Plume Rouge
Pride of Houston
Queen Mary
Red Cap
Red Gem
Red Imp
(may grade A in 1949)
Richard
Rocket
expect to rate A in 1949)
Roger Bacon
Santa Lucia
Seminole Chief
(fades)
Semperflorens
(good)
Silver Star
(good)
Sulen
Sun Gold
Sunkist
Viking
(should rate A in 1949)
Vivian Toole

MY BEST 25 DAYLILIES

ELIZABETH LAWRENCE, *North Carolina*

It takes about three seasons to evaluate a daylily. At first you consider the individual flower, its size, form, substance, pattern and color. Later you take into account the mass effect of the clump, the season and length of bloom, and the general garden value. When you consider the effect of the clone in the garden, the size and pattern of the individual flower are no longer important. The clone, Dr. Stout, which I did not fully appreciate at first, has grown in its third year to such a fine strong floriferous clump, and has bloomed so gayly for so long, that I now rate it with Carnival as one of the finest.

When you consider bloom in the border over a long period, the early and late varieties become more important, in spite of their faults, than fine midseason varieties of which there are so many. Daylilies take up a lot of space. In order to have a long season of bloom in a fairly small garden one must eliminate fine midseason clones, and choose instead less beautiful ones that bloom early and late in the season. The earliest in my garden bloom in April. In this season I have been able to find no greater variety than the pale yellow of *Hemerocallis Dumortieri*, and the deep orange yellow of Dr. Regel. For the late ones, there is more variety, but still not enough. There is continuous bloom from early April to the end of July, but the July bloomers are comparatively few, and in August in my garden, only Boutonniere is left. It is not really a very good daylily. The stems are weak, and the flowers small and a poor color, and yet I would not be without it because of its late bloom.

MY 25 BEST DAYLILIES

Early (April)	Early Mid-season (May)	Mid-Season (June)	Late (late June & July)
	I. My 15 Best Daylilies		
1. **Dumortieri** (Y)	2. **Mikado** (Ed) 3. **Queen of May** (OY) 4. **Lidice** (O)	5. **Carnival** (P) 6. **Iowa** (LY) 7. **Fire Red** (R) 8. **Mrs. B. F. Bonner** (Y) 9. **Ophir** (O) 10. **Golden Dream** (O) 11. **J. A. Crawford** (Y) 12. **Dr. Stout** (B) 13. **Victory Taierhchwang** (R)	14. **Dorothy McDade** (Y) 15. **Boutonniere**
	II. Next 10 Best		
16. **Dr. Regel** (O)	17. **Victory Montevideo** (R) 18. **Mayor Starzynski** (B) 19. **Queen Wilhelmina**	20. **Berwyn** (R) 21. **Goldeni** (O) 22. **Starlight** (LY) 23. **Tejas** (R)	24. **Potentate** (Pur.) 25. **Chandra** (Y)

REPORTS FROM REGIONAL DAYLILY TRIAL GARDENS

[Reports from a number of Regional Daylily Trial Gardens have been received, and are reproduced below.]

1. DAYLILY TRIALS AT GREENWOOD PARK

Paul L. Sandahl, *Supt.*,
Des Moines, Iowa, Park Board

(See Plate 318)

The newer things (anyway the new ones to us) are too young yet for full judgment, some of them have not even bloomed as yet. Among them however, which have made a showing is Reinbeck. Outstanding for strength, it is tall and beautiful. The main tone of its large flowers is straw or cream color to light yellow with the most dainty flush of maroon as if some phantom painter had touched each petal with a dry brush. It is floriferous, several blooms out at the same time, and has sweet fragrance. Papagaio is shorter—to about two feet—very strong and is showy out of doors with its red, orange red, and vermillion. Iowa shows up well out of doors. It is clear light yellow with stippled texture and full broad flowers, and is shorter than Reinbeck.

Actions of the general public so often unpredictable are sometimes seemingly unreasoning. Certain individuals, and not a large number of them, are very much interested in hemerocallis and know and grow the best varieties are always willing to discard any of them for a better variety. They are the ones who I think will carry the hemerocallis interest and advancement on through the years. A little larger proportion of the general public like to have those brilliant or dainty spots in their garden at this time of year that can be obtained only with hemerocallis. They don't care what the name is just so its hemerocallis and one the neighbors don't have. Then the big majority pass by within a few feet of the most beautiful creation of its class without notice because they seem to think (and some of them say it) "there's that corn lily we used to have out on the farm," or "Mother used to have some of those lemon lilies right by the well." More time for general education, and a lot of elimination of similar varieties no doubt will help to get discriminating interest of the large majority of the people.

The best 25 clones of those tested for at least three years, are as follows:

Hyperion	San Juan	J. A. Crawford
Pale Moon	Fire Red	Reba Cooper
Mrs. John Tigert	Peony Red	Mayor Starzynski
George Kelso	Duchess of Windsor	Helen Wheeler
Granada	Carnival	Florham
Theodore Mead	Osceola	Dr. Regel

La Tulipe	Amaryllis	Dr. Stout
Lidice	*H. fulva*	
Mikado	Lemoni	

Of course when some of the newer ones prove themselves a little farther we certainly will place them at the head of this list. It is always difficult to specify a list like this and often brings deep chagrin to the one who does it, because the question is always asked, "well what's the matter with the following?

Bijou	Burmah	Mildred Orpet
Goldeni	E. A. Bowles	Estelle Friend
Bay State	Woodlot Gold	Elaine
Mrs. Wyman	Ember Glow	The Gem
Yellow Hammer	John Blaser	George Yeld
Harvest Moon	Rouge Vermilion	

The answer must ever be that it depends on who was the judge or the narrator.

The following have disappeared from the garden.

Adventure	Vesta	Victory Taierhchwang
August Pioneer	Vulcan	Autumn Prince
Circe	Anna Betscher	Gold Dust
Gracilis	Craemore Henna	Victory Montevideo
Rajah	Golden Mantle	Waubun
Soudan	Queen Mary	

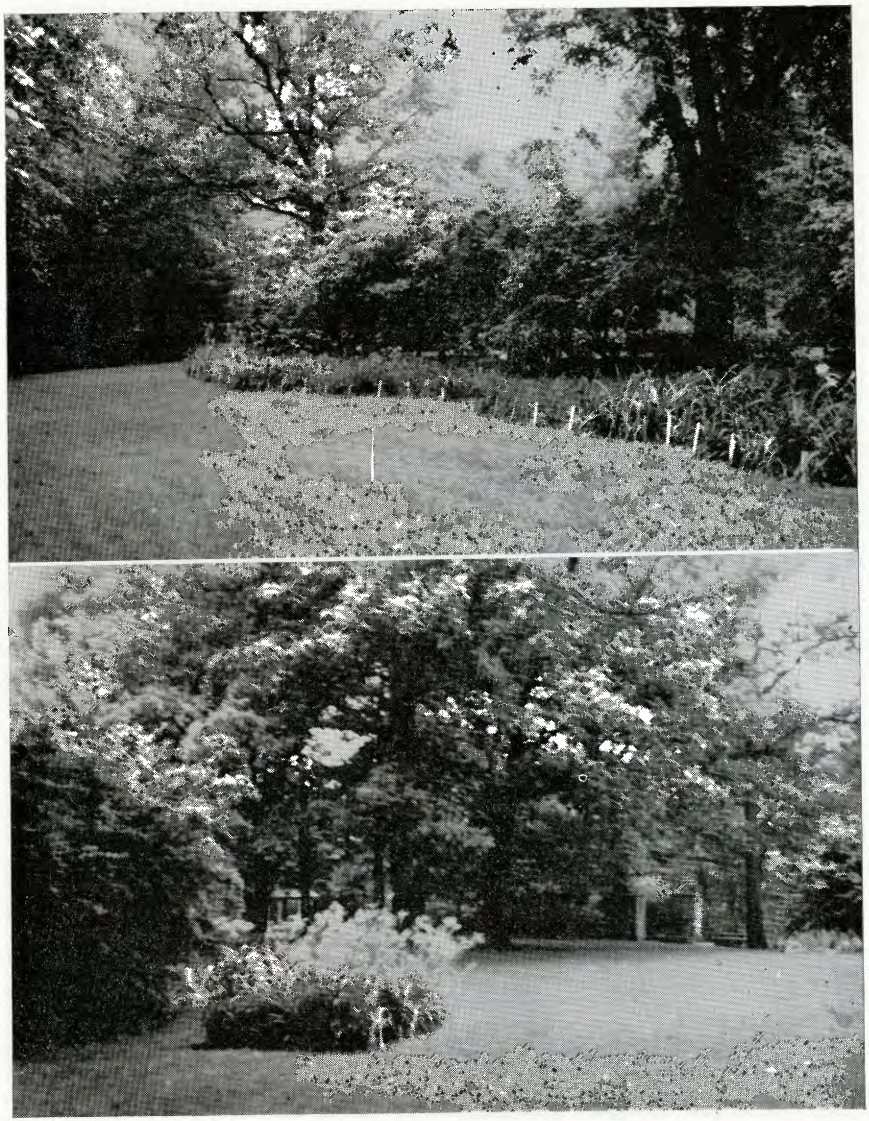
Some might have been appropriated by a ravenous admirer, and some might have died from no reason chargeable to themselves. However, we have simply replaced those that disappeared with another variety which we had at hand. It may be that a second trial might prove some or all of them to be first class.

The following are all medium to strong growers which include some that have a tendency for the foliage to yellow. This sets them back a little each year so that they about hold their own. We do not know the cause nor the remedy for it.

Norcensis	Peony Red	Miranda
Harvest Moon	Elaine	Cressida
Lovett's Lemon	Araby	Fred Howard
Shirley	Domestico	Emily Hume

Sir Michael Foster is weakest live one we have.

All other varieties in the garden are rather uniform in their hardiness and strength of growth, producing full healthy plants and abundant blooms.



Greenwood Park, Des Moines, Iowa, showing two portions of the hybrid *Hemerocallis* Test Gardens.

Plate 318

2. DAYLILY ADAPTABILITY TESTS AT COLLEGE STATION, TEXAS

H. T. Blackhurst, *Horticulturist*

Department of Horticulture, Texas Agricultural Experiment Station, College Station, Texas

During the last five years some two hundred daylily clones have been under observation at College Station. Of this number perhaps twenty-five or thirty might be considered very well adapted while a number of others have shown characteristics of sufficient merit to warrant culture where particular attention can be given to their care.

For purposes of rating, characters have been judged under eight categories each having an assigned value and the eight values making a total of 100 points. When all observations are made and notes collected, the values are totaled and the sum used as the basis for rating clones. This is a very severe score card which is used to obtain the relative position of each clone.

Flower color and texture have been given a total value of 35 points, flower form and scope each 15 points, flower durability and plant vigor 10 points each, flower size 8 points, foliage 5 and flower odor 2 points.

No attention has been given to the use of the clones in landscape design since the purpose is only to test them for adaptability to the conditions of this area. Since all have been grown under open field conditions without irrigation, the results have perhaps failed to isolate some desirable varieties that could be used successfully under home garden conditions. The tests have, however, shown that the daylily is a hardy grower and could be used successfully and advantageously in the home flower garden.

Table 1, lists the best thirty clones thus far tested in order of their score. Not all point scores are given, only those being included that are of outstanding interest. All categories are, however, included in the over all rating. It should be noted that these relative numerical ratings are not directly comparable with those obtained by using the Official Score Card of The American Plant Life Society. Therefore, the final ratings, A, outstanding in adaptability, and B, very well adapted, under the conditions of the tests, are given in the last column of the table for ready reference by the amateur.

Conclusions: Results of the daylily adaptability tests point to the flower as a very hardy yet attractive one for use in landscape design or the home flower garden. The daylily is able to withstand the hot, dry summers and still produce a profusion of bloom in the spring and fall season. It is hoped that more emphasis will be placed on this flower and that the future will see it more freely used around the home.

Table 1. Relative and final ratings of the thirty best daylilies tested for adaptibility at College Station, Texas, under open field conditions without irrigation. It should be noted that this is a very severe test, and that the score card also was very severe.

Variety	Plant Vigor	Scope		Flower		Color Purity	First Bloom	Relative Rating[4]	Final Rating[5]
		Height	Desirability	Size	Durability				
Dauntless	7	2-3	8	med.	9	26	5-21	88	A
Domestico	8	1-2	10	small	7	28	3-16	86	A
Eldorado	9	3-5	9	med.	5	25	5-12	82	A
Tangerine	7	1	8	small	10	30	3-28	82	A
San Juan	4	2-3	9	med.	10	30	5-17	81	A
Harvest Moon	8	2-3	9	med.	5	28	5-11	80	A
Michael Foster	7	3-5	9	med.	9	20	5-15	80	A
Pale Moon	9	2-3	8	med.	7	25	5-18	80	A
Queen of May[1]	7	2-3	8	med.	8	25	4-30	78	B
Lidice	8	2-3	8	med.	8	20	5-12	77	B
Ophir	8	2-3	8	med.	5	25	5-18	77	B
Burmah	7	2-3	8	large	8	25	5-24	76	B
Cinnabar	9	2-3	8	med.	7	20	5-12	76	B
Queen of May[2]	6	2-3	8	med.	8	25	4- 9	76	B
Burbank	8	3-5	7	med.	7	25	4-26	75	B
Queen of May[3]	9	3-5	8	med.	5	25	5-14	75	B
Emily Hume	5	2-3	8	large	7	28	5-12	74	B
Helen Wheeler	10	1-2	8	med.	8	20	5-10	74	B
Peony Red	4	2-3	8	med.	8	30	5-17	74	B
John Blaser	6	2-3	8	med.	7	25	5-13	73	B
Queen Wilhelmina	8	3-5	8	med.	9	20	5-12	73	B
Indian Chief	2	2-3	8	med.	7	30	5-18	72	B
Hyperion	2	2-3	8	large	8	25	5-15	71	B
Estelle Friend	6	2-3	8	med.	7	22	5-12	70	B
Marconi	5	2-3	7	small	10	20	5-13	70	B
Mayor Starzynski	7	2-3	9	med.	5	20	5-15	70	B
Mikado	8	2-3	8	large	7	20	4-22	70	B
Mrs. John J. Tigert	6	2-3	8	large	8	25	5- 2	70	B
Spartan	7	2-3	8	med.	3	25	4- 9	70	B
Victory Taierhchwang	4	2-3	8	med.	8	21	5-24	70	B

[1] From Univ. of Fla.

[2] From The American Plant Life Society.

[3] From H. M. Russell, Spring, Texas.

[4] The relative ratings for adaptibility are based on a very severe score card and these numerical ratings are to be considered only from the standpoint of the relative position of the clones. For final ratings see next column.

[5] The final ratings, **A, outstanding in adaptability,** and **B, very well adapted,** are comparable with similar **A** and **B** ratings by amateurs, and are to be used to characterize these clones for adaptability to the severe conditions of the tests.

3. DAYLILIES AT WHITNALL PARK

JOHN E. VOIGHT, *Acting Supt.,*
Botanical Gardens, Hales Corners, Wisconsin

In our 1947 progress report, we mentioned plans for revising our entire *Hemerocallis* collection, and we are pleased to report that this was accomplished this past spring. Due to the lifting, dividing and resetting of the plants, naturally the growth has been retarded and the performance has not been up to normal this season. However, on the basis of past observations of the entire collection, we feel that the 38 clones included in Table 1 are tops from the standpoint of color, size, length of blooming season, foliage, sturdiness of stems, and effectiveness in the landscape.

Table 1. List of 38 best *Hemerocallis* clones at Whitnall Park as of 1948.

Autumn Prince	Eldorado	San Juan
Bagdad	Fire Red	Senator Andrews
Baronet	Fulva Cypriana	Serenade
Buckeye	Goldeni	Sir Michael Foster
Carnival	Helen Wheeler	Theodore Mead
Cinnabar	Hyperion	Theron
Circe	La Tulipe	Triumph
Craemore Ruby	Marconi	Victory Taierhchwang
Cressida	Mrs. John Tigert	Wekiwa
D. D. Wyman	Mrs. W. H. Wyman	Yellow Hammer
Dr. Stout	Pale Moon	Zouave
Duchess of Windsor	Peony Red	
"Dwarf Yellow" (not dwarf)	Royal	
	Russell Wolfe	

We note with great pleasure the ever increasing interest in the daylily collection here at the Botanical Gardens. The entire collection is now concentrated in one area, creating a picture with no end of beauty. The present mass planting of daylilies is backed by commanding giant varieties of delphiniums in conjunction with an interesting background collection of trees and shrubs. The brilliant daylily and delphinium flowers gives a dominating interest to the recess in which they are set.

Acknowledgement of gratitude is due to the hybridizers for having made available this most interesting collection. With their cooperation it has been possible to bring together a vast amount of material in compact arrangement for comparative study, and at the same time to add immeasurable beauty and interest to the collection here at the Botanical Gardens, Whitnall Park.

4. HEMEROCALLIS FOR NORTHERN FLORIDA

JOHN V. WATKINS, *Assoc. Prof. Hort.,*
University of Florida, Gainesville

Today there are some 3,000 varieties of Hemerocallis. From such an imposing list, how shall we appraise clones for Florida conditions? Many are highly touted varieties that are given places of prominence and the advantage of color plates in widely circulated catalogs; others, perhaps, are worthy garden plants though less well known because of restricted regional distribution and little or no advertising.

Trial is the only possible answer. Trial, alongside other daylilies, under normal gardening conditions over several seasons, and then fair and impersonal rating by experienced gardeners. In appraising daylily seedlings, one must have the background of having viewed large numbers of standard varieties already in commerce, because it is well known that types appear in every group of seedlings, that are close approaches to existing clones. Segregation of characters in seedlings of complex lineage accounts for this widely accepted fact.

On the campus of the University of Florida is located one of the Regional Test Gardens for Hemerocallis. Here are received for trial, seedlings from the breeding plots of some of the nation's leading hybridizers; here too are grown many new and old commercial varieties.

For a dozen years this garden has witnessed the passing parade of many different daylilies. Old European varieties, species from the Orient, and brand new seedlings from the plots of the nation's leading hybridizers have grown side by side. Usually, each introduction is kept for three years, during which time notes and observations are taken on the characters noted below. These notes become a part of the permanent record of the project and are later used in arriving at the numerical ratings. Strongly influencing these ratings are remarks and opinions of the Hemerocallis fanciers who visit the campus from time to time. While the ratings are solely the writer's, they can well be considered consensus because they are so strongly influenced by the reactions of our visitors as they view the clones in flower. It should be noted here that the ratings are very close to those published by two Hemerocallis specialists in Orlando.

The following characteristics are used as a basis for the numerical ratings:

VIGOR—Rapid growth under Florida conditions is of greatest importance
FOLIAGE—A mound of evergreen foliage for year-round garden value.
SCAPE—The flower stem should be stout, four-branched and floriferous.
FLOWER—Distinctiveness, shape, form, size, color, texture, durability in the Florida sun, and fragrance are considered carefully.

In Table 1 are listed 32 clones which have received a rating of 9.1 or above. While this list contains only 1% of the clones in commerce,

these are the ones which have rated highest through the years. In all probability a favorite of yours has been omitted, and possibly you consider our rating for a given clone much too high, another too low. For this we beg remission. Perhaps we have not received for trial a clone in which you are particularly interested. Maybe its rating will appear in a future list. Daylily selections rating below 9.1 are listed in Table 2.

Table 1. RATINGS OF DAYLILIES AS GARDEN PLANTS IN NORTHERN FLORIDA

VARIETY	COLOR	RATING*	REMARKS
AURANTIACA	orange	9.9	This is our best species.
AUREOLE	yellow	9.9	Rated thus for its extreme earliness.
DAUNTLESS	yellow	9.9	Full flower, heavy texture.
EMILY HUME	yellow	9.9	Robust grower, free bloomer.
HYPERION	lime yellow	9.9	A national favorite.
MIKADO	yellow, dark eye	9.9	Still the best eyed type.
PATRICIA	lime yellow	9.9	Popular because of its fragrance.
SEMPERFLORENS	yellow	9.9	Rated tops because of its earliness.
WAU BUN	yellow	9.9	Medium stature, beautiful form.
SAN JUAN	wine red	9.8	One of the best deep reds.
SWAN	canary yellow	9.7	The largest daylily we grow.
BAGDAD	orange and brown	9.7	Good grower, floriferous.
MILDRED ORPET	pastel bicolor	9.7	Distinctive and charming.
KANAPAHA	rose luster	9.6	Appears on many national lists.
BARONET	Brazil red	9.6	One of the earliest reds.
RUBY SUPREME	ruby red	9.6	Large, well branched deep red.
CABALLERO	bicolor	9.6	The writer's favorite bicolor.
MINOR	yellow	9.6	The best dwarf species.
BICOLOR	bicolor	9.5	Dwarf companion for CABALLERO.
SACHEM	wine red	9.6	Top red from N. Y. Botanic Garden.
B. H. FARR	grenadine pink	9.6	First of the near-pinks.
TARUGA	lime yellow	9.7	Popular large yellow dusty tawny.
CLUNY BROWN	pastel bicolor	9.5	Distinctive Florida origination.
DUNCAN	maroon red	9.5	Earliest dark red from Wheeler.
ROYAL RUBY	ruby red	9.5	Top red from New England.
WOLOF	deep red	9.4	Very late red, robust grower in Florida.
GANYMEDE	pastel bicolor	9.4	A distinctive Wheeler origination.
MARCELLE	orange and brown	9.1	Excellent grower, early bloomer.
AMHERST	wine purple	9.1	A new color break.
BLACK FALCON	mulberry fruit	9.1	One of the darkest Hemerocallis.
INDIAN CHIEF	red	9.1	An excellent Florida red.
BOBOLINK	purple and gold	9.1	Sprightly, unusual, floriferous.
BRACKEL	netted brown	9.1	Entirely distinctive Hemerocallis.

* These ratings are taken from articles by this writer. 9.6-9.9—Excellent 9.1-9.5—Very Good. —J. V. Watkins.

Table 2. Additional Hemerocallis selections for northern Florida, John V. Watkins, 1948.

Ajax
Allapattah
Carnival
Chisca
Chrome Orange
Daisy Whistler
Dawn Play
Debonair
Dorothy McDade
Halo
Killarney Lass
Lady Franklin
Mayor Starzynski
Merry Mood
Modesty
Mrs. A. H. Austin
Ophir
Ortensia
Rose Gem
Royal
Royalty
Serenade
Sir Michael Foster
Sirius
Soudan
Stampede
Star of Gold

Fig. 190. Portion of *Hemerocallis* Test Garden at Cornell University.

Duchess of Windsor
Dr. Stout
Easter Morn
Europa
Fantasia
Florham
Fulva Rosea
Fulva var. maculata
Garden Lady
George Kelso
Georgia
Golden Bell
Parthenope
Persian Princess
Pink Charm
Pink Lass
Pink Lustre
Port
Potentate
Prima Donna
Princess
Queen of May
Radiant
Red Bird
Starlight
Sweetbriar
Tamiami
The Gem
The Yearling
Theodore Mead
Vesta
Vulcan
Welaka
Winsome
Zouave

5. HEMEROCALLIS TRIALS AT CORNELL

L. H. MacDaniels, *Head*
Department of Horticulture & Ornamental Horticulture
Cornell University, Ithaca, N. Y.

The test garden area for ornamentals contains a considerable amount of other material besides *Hemerocallis*. The illustration (Figure 190) shows one of the beds which is given over to *Hemerocallis* clones. The general scheme is to plant three plants of each clone in succession in a row.

It is hoped that before another year goes by we will be able to give the *Hemerocallis* collection more attention.

R. H. S. COLOUR CHART

The readers will be interested to know that the "R. H. S. Horticultural Colour Chart" is again available. This work has been recently reviewed (Horticulture, Nov. 1947) by Dr. Donald Wyman, Arnold Arboretum, Harvard University, Cambridge, Mass. The price of the Chart is $10.00 plus shipping charges. Anyone interested in obtaining this color chart should write directly to: Royal Horticultural Society, Vincent Square, Westminster, London, S. W. 1, England.

FLOWER PRESERVING PROCESS

Stanley E. Saxton, *New York*

Attempts to preserve the blossoms of *Hemerocallis* by means of the recently introduced "Jo-Fleur" process have proven a failure. The first group of blooms were picked early in the day and subjected to the first dipping according to directions. Some drooped and collapsed at once, especially the yellow types. Some retained their shape and were hung up covered with the frosty coating. By afternoon every blossom had spoiled.

A second group of blooms was tried. These were picked about noon. A slightly lower temperature was tried on the first immersion bath. Part were dipped at 120 degrees F; part at 125 degrees F, and part at the recommended 130 degrees F. This time several excellent blooms were obtained with the first coating. These were again hung up to dry, but by evening all the flowers were again limp.

Indications are that this process is not successful for preserving the blossoms of *Hemerocallis*.

REGISTRATION OF NEW AMARYLLID CLONES

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

This information is published to avoid duplication of names, and to provide a space for recording brief descriptions of new Amaryllid clones. Names should be as short as possible—one word is sufficient. It is suggested that in no case should more than two words be used. *The descriptions must be prepared in the form as shown in the entries below, and must be typewritten and double-spaced.* The descriptive terms used should be in harmony with those given in the "Descriptive Catalog of Hemerocallis Clones, 1892—1948" by Norton, Stuntz and Ballard.

There is close liaison between the AMERICAN PLANT LIFE SOCIETY and the HEMEROCALLIS SOCIETY regarding the registration of new *Hemerocallis* clones, and such new names can be sent to the registrars of either society and will automatically be included in the records of both organizations.

Correspondence regarding new amaryllid clones, including *Hemerocallis,* to appear in HERBERTIA should be addressed to Prof. J. B. S. Norton, 4922 42nd Ave., Hyattsville, Maryland, *enclosing self-addressed, stamped envelope, if reply is expected.*

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

HYBRID DAYLILY (HEMEROCALLIS) CLONES

TRIAL GARDENS. Cooperative daylily trial gardens have been established at (1) *Cornell University, Dept. of Floriculture, Ithaca, N. Y.;* (2) *University of Florida, Dept. of Horticulture, Gainesville, Fla.,* (3) *Southwestern Louisiana Institute, Dept. of Horticulture, Lafayette, La.;* (4) *Whitnall Park Arboretum, Milwaukee City and County Park Board, Milwaukee, Wisc.;* (5) *Texas A. & M. College, Dept. of Horticulture, College Station, Texas;* (6) *Des Moines Park Board, Des Moines, Iowa,* (7) *Div. Ornamental Hort., Univ. of Calif., at Los Angeles.* [Complete addresses are given under *Officers and Committees, below.*]

Introducers should send complete collection of hybrids to these cooperating agencies in order that the new daylily clones may be impartially evaluated.

Introduced by Stanley E. Saxton, Saratoga Springs, N. Y.

Cotillion. (B. H. Farr X Redbird). A large brilliant orange-

scarlet flower. Segments near "Blaze Sheik," M&P 3J11 with blood red veins and a deeper glow in center of petals. Flower opens widely, closing after dark with little fading. Flowers 5″, Scapes 34″, late midseason. Seedling No. 48-136.

Charisse. (Rosalind X Sweet Sue). Regular flower, size and form of Rosalind, petals wider. Color "Tango Pink," M&P 3J8, with small eye marking of wild raspberry, M&P 6E6. Sepals a shade lighter. 15 to 20 buds. Early midseason. Flower 4″, scape 38″. Seedling No. 47-23.

Dryad. (Bobolink X Domestico). Small bicolor with wide light maroon purple petals, somewhat pinched at tips, and light yellow sepals. Slender stalks with multiflora branching. Free blooming with many stalks. Flowers 3½″, scapes 24″, Early. Seedling No. 48-2.

Griselle. (B. H. Farr X Theron) Medium small flower with very wide recurved and overlapping petals of raspberry red, M&P 3K9, veined deeper. Flower 4″, Scapes 26″, Early midseason. Seedling No. 46-8.

Originated and introduced by John V. Watkins, University of Florida, Gainesville, Florida.

Black Prophesy—Plant very prolific in northern Florida, multiplying rapidly to form large clumps. Foliage, deciduous, very late to start, upright, light green. The scapes are slender, stiffly erect, well branched, and hold the flowers upright in good arrangement. The flowers are small but very full as the broad tepalsegs are overlapping. The throat is chartreuse, the eye zone is not noticeably differentiated from the remainder of the tepalseg, and the setepalsegs and petepalsegs are of the same value. The color approaches mulberry fruit (M & P—Plate 56), with the veining slightly darker. This seedling, resulting from selective breeding for dark flower color, flowered first on April 15, 1945 and has been used in the breeding program subsequently because of the very dark pigmentation of its flowers, extreme earliness and well branched scapes.

Because growth is discontinuous and the plants have no garden value in winter time, ramets of this clone are being distributed among members of the Men's Garden Club of America who live in temperate sections of the United States. No distribution in the Deep South will be made, and no plants will be sold.

Introduced by J. B. S. Norton, Hyattsville, Md. (Named by George Gilmer, Charlottesville, Va.)

Genevieve. Height of foliage 24-30 inches, height of scape 30-46 inches, blooming June and July, orange. Flowers never fade in the hottest sun, and look well when wind and rain have bruised other bloom so that they are not presentable.

Introduced by Ralph W. Wheeler, Winter Park, Florida.

Ming Toy. A ruby red semi dwarf, early to flower and, being free with its stems blooms over a long period. It has stems up to 18″ and has had as many as 30 flowers to a stem.

Olympus. This flower is huge, the largest in segment area of any seedling I have had. Also it has a beautiful, well open form and is car-

ried well on a strong stem which is sufficiently tall for this large flower. It is truly a magnificent specimen. The color is light orange with areas of a glistening, light peach dusting.

Psyche. A definite break in hemerocallis form. It is a very large flower with wide, very long segments which recurve as do the falls of an iris. The petals are beautifully creped and ruffled. The color is light yellow with a faint blush of dusting in the mid petal section. The throat is liquid green. Stems are four feet.

Vega. A semi dwarf in deep wine purple with a bright canary throat. The small flowers have very wide segments, are compact, well open and beautiful both in coloring and form. The stems are 16″ and have held as many as 24 flowers.

Chanticleer. A bright crimson with a slight violet sheen; the throat is orange-yellow as are the narrow bands along the petepalseg midribs; the flower is medium large, regular in form, well open with the setepalsegs more recurved than the petepalsegs; the scapes are 30″, and it blooms in mid-season in Florida.

Introduced by Mrs. H. W. Lester, Atlanta, Ga.

Gala. Midseason to late, deciduous. 36″. Five inch bloom of glowing ruby red velvet. Stands the sun well. Two bloom periods.

Galahad. Midseason, deciduous. 30″. Five inch bloom of dark maroon velvet. Very strong growth. Stands the sun well.

Laurel. Midseason to late, deciduous. 36″. 25 or more blooms on well branched scapes. Satin smooth petals and sepals of bright laurel pink, with green throat. Two bloom periods.

Limelight. Midseason to late, deciduous. 30″; 6″ to 7″ bloom of lemon yellow. Petals broad and slightly revolute. A self in color and of porcelain like substance. Does not fade in hottest sun.

Marco Polo. Late, deciduous. 36″. Strong growth. 25 to 30 blooms of bright red velvet. Darker eye zone. Well branched.

Peach Blush. E to M; de.; 40″; soft buff yellow, pink eye-zone.

Peachtree Beauty. M to La; de.; 30″; pinkish-buff.

Spotlight. E to M; de.; 50″; pale yellow.

Maid Marian (error, ''Maid Martan,'' Myb. 2, p. 81. 1948).

Introduced by Mrs. Garrett (Marie) Hydeman, Grand Rapids, Mich.

Ives. 36″; M; R4D; ext.; (Leonian hybrid sdlg.) Brown red self, 4½″ across. Petals and sepals recurving, blooms July 15th.; remains open after 8 o'clock at night.

Red Indian. 36″; M; R4D; ext.; (Leonian hybrid sdlg.) Red self, same color as Indian red artist's paint. 4″ open flower; remains open after 8 o'clock at night. Starts to bloom July 7th., and repeats in October.

Turk's Cap. 36″; M.; R7D; ext.; (Leonian hybrid sdlg.) Dark red self, same color as Turk's Cap Lily. 4″ open flower, medium width petals, blooms July 6th., remains open after 8 o'clock at night.

Introduced by Walter D. Button, Midlothian, Illinois.

Delta Song. 29 inches. July-August; garnet with Indian red edging. Wide, recurved petals. Mid rib on both petals and sepals. Golden cup. Flower 6½ inches.

Talent. 30 inches. July. Florida gold self, clear. Flower 3½ inches across.

High Hat. 36 inches. July-August. Ta-Ming yellow. Large 7 inch flower, recurved, clear color.

New Look. 26 inches. July; cowslip yellow. Small 2½ inch flowers. Ruffled.

Gipsy Dance. 36 inches. July. Korea red. Wide petals; Chinese gold and tan sepals, Slightly ruffled. Light chrome yellow throat. Flower 3½ inches.

Gay Greetings. 36″; M; Y7M.

Introduced by George Gilmer, Charlottesville, Va.

Portia. 36″ high; a self blend, the color of Sunburst (M & P 10K9) with veins of Pond Lily (M & P 10K9), the overall effect being mellow-glow (M & P 10I6). Petepalsegs are frilled and slightly twisted, upheld by a strong midrib; setepalsegs are smooth and recurved. Does not fade and remains open evenings. Same color as the peach variety, Golden Jubilee. 5″ diameter flower.

Introduced by Geddes Douglas, Nashville, Tenn.

Black Magic. Cup shaped. Deep purple-maroon. Green throat. 40 inches. Early midseason.

El Magnifico. Large open flower. Blend of bronze, yellow and red. Edges of petals ruffled. Orange throat. 38 inches. Midseason.

Peppermint. Modified Cup. Bright red. Petals and sepals have cream line down center and are edged with cream border. 42 inches. Midseason.

Pink Radiance. Modified cup. Large clear bright pink with deep geranium pink halo. 45 inches. Late.

Introduced by Ralph M. Schroeder, Warrensburg, Ill.

Fireball. (Parentage record lost, probably Matador x Rascal) Medium sized flowers with segments of good width. Velvety combination of red and orange. The color pattern is unusual in that the red of the outer portion of the petals seems to overlap the orange of the throat in a band about 3/8 of an inch wide. Season of bloom July-August. 28 buds on a 32″ stem. Seedling No. 47-106.

Golden Girl. (Kraus seedling x Mission Bells) Large 7″ flowers with wide petals. The petals are somewhat curled and twisted. Color shades from deep golden yellow at the midrib of the segments to lighter yellow at the edges. Very weather resistant. Season of bloom June-July. 38 buds on a 42″ stem. Seedling No. 48-42.

Naivette. (Moonbeam x Dauntless) Flowers 6″ in diameter with petals 1⅛″ wide. Recurving sepals give the flower a triangular form. Pale creamy yellow with a faint halo of fulvous pink which parallels the

outline of the flowers. 38 blooms on 45″ stem. Seedling No. 47-73. Season of bloom July-August.

Introduced by Claude E. Rudy, Overland, Mo.

Waverly. Well rounded flower, similar in size to *H. fulva rosea,* the pollen parent, but a more uniform flower. Color—glowing dark rose with deeper eye zone on petals. Well branched 40″ stalks. Good foliage. Free bloomer in late June—July. Stands hot sun very well. No. 43 (Rajah x *H. fulva rosea).*

Grandview. A mixture of ruddy orange, brown red, and bronze on a 45″ stalk. Large well formed flowers 5″x7″. Strong plant, with good foliage. Somewhat resembles Purple Waters, but much better formed flower, and stands hot sun better. Blooms late June-July. No. 47 (Hyperion x *H. fulva rosea).*

Belmont. A sister seedling of Grandview. Color is a blended mixture of copper, orange, and bronze. Size 4½″x6″. Wide ruffled petals with faint tan midrib. Sepals are a smooth mixture of the above colors which gives a reddish copper effect with tan edges. Strong 38″ stalk. Blooms late June-July. No. 48 (Hyperion x. *H. fulva rosea).*

Eureka. Light reddish orange flower with deeper eye zone that extends half way up the petals in inverted "V" shape and is accented by faint tannish midrib. The large 6″x7″ flowers stand the sun well. Petals are slightly ruffled, but sepals are smooth. The stalks are about 45″, and the plant is a vigorous grower. No. 93 (Hesperus x *H. fulva rosea).*

Introduced by J. B. S. Norton, Hyattsville, Md.

Artemis. Scape 2-3 feet, flowers 5 inches wide, wide open, light yellow, M. & P. 9-L-1, setepalsegs ¾ inches wide, the sides nearly parallel, petepalsegs 1½ inches wide, widest near the apex which is round as a half circle. Day blooming and sun resistant, with thick tepalsegs, in July.

Albert Gorham. Scape strong but graceful, 5-6 feet high, flowers in July, 5 inches wide, wide open, setepalsegs light brown and yellow, M. & P. 4-I-11, ¾ inches wide, petepalsegs darker M. & P. 5-E-10, 1½ inches wide, with wide light midline giving the flower a very bold aspect.

Prevernal. Scape about 2 feet, flowers few, light yellow, 3 inches wide, star form, tepalsegs pointed. Very early, by protection from frost has bloomed April 18.

Introduced by Mrs. Joseph Bremken and Mrs. Floyd Armstrong, Omaha, Nebr.

Howdy. A bicolor. Sepals a light green yellow, Petals Morocco red with a broad greenish yellow median line extending the length of petals. Throat deeper green yellow. Flowers large and full of heavy substance and holding up well. Midseason bloomer. Stems 40 inches with good branching and many buds. A deciduous variety and fully hardy. Makes a brilliant spot. (Hyperion x Black Falcon.)

Prairie Girl. A polychrome. Deep chrome with wide petals flushed orange cinnamon and a faint eye zone slightly deeper in color. Flowers

large and full with a 5 inch spread, of good substance. Stems 50 inches with good branching and many buds. A midseason to late bloomer and deciduous grower. Throat sulphur yellow. (Annis Victoria Russell x Seven Seas.)

Introduced by (Henry E. Sass) Maple Road Gardens Sass Brothers, Route 1, Omaha 4, Nebraska.

Apricot Queen. Sdlg. 45-54; ML—Y4M. Apricot colored self. 40 flowers on a 40 inch stem. Blooming time from the first of August to late August.

Chief Fontenelle. Sdlg. 45—35; M—R5M. Petepalsegs are apricot orange, setepalsegs zinc orange, with darker eye zone. Fairly large flowers with 30 to 40 flowers on a three foot stem. Blooming time is mid-July to mid-August.

Copper Colonel. Sdlg. 45-18; M—S5M. Petepalsegs are Hays russet with yellow midrib, one and 7/8 inches broad. Setepalsegs are yellow, heavily flushed Hays Russet. Greenish yellow throat. Height 40 inches. 40 to 50 flowers on a stem. Mid-July to Mid-August.

Gay Charmer. Sdlg. 45-2; M—S9L. Petepalsegs are vinaceous rufus with capucine midrib and throat. Setepalsegs capucine yellow flushed vinaceous rufus. Height 40 inches. 30 to 40 flowers on a stem. Mid-July to Mid-August.

Prairie Gold. Sdlg. 45-27; EM—Y4D. Dark orange self, ruffled. Medium to large sized flowers. Height 40 inches. Wide branching with 50 flowers to a stem. Blooming season from first of July to Mid-August.

Sungod. 40″; M; Y4D.

Introduced by Mrs. J. A. Womble, Fort Worth, Texas.

Ambrosia. 30″; M; S6L; de. A creamy flower with broad petepalsegs, setepalsegs slightly reflexed, both carrying different tints.

Kachina. 30″; M; Y4L; fr. Clear soft yellow. Tepalsegs ruffled.

Kismet. 36″; M; Y7D. Golden orange, broad tepalsegs.

Moon Magic. 48″; EM; R4M; ev. Orange star shaped flower.

Nancy Lee. 24″; E-M; Y4M. Large clear yellow self, broad tepalsegs.

Nicollette. 30″; EM; S8L. Petepalsegs the color of a ripe banana with shaded eye zone, setepalsegs overcast rose.

Temptation. 30″; MRe; R4M. Bright orange red. 4″ bloom.

Tonto. 30″; M; R7M; ev. (The Alamo X Margaret Perry) Copper red, 4″ bloom.

Tia Juana. 38″; EM; R7M. Wine red. 5″ bloom.

Introduced by E. J. Kraus, Chicago, Illinois.

Autumn Daffodil. 30 inches. Leaves 30 inches, bright green, medium width, upright, recurved, forming well closed mass, 24 inches tall. Scapes 30 inches tall, slender, upright, 3 to 4 branched, 25 to 30 buds.

Flowers 2¾ inches in diameter, widely open; tepalsegs broad, overlapping, reflexed. Petepalsegs 2½ inches long, 1 inch wide, ruffled,

lemon chrome to straw yellow, bright, clear, and glistening. Setepalsegs 2¼ inches long, ½ inch wide, same color as petepalsegs. Free blooming starry flowers resembling daffodils. Faint pleasing odor. Blooms throughout August into September. (Sunny Morn x [(Dominion x Gypsy) x (Amaryllis x Golden West)]).

Bruno. 36 inches. Scapes sturdy, erect, 2 to 3 branched, 20 to 25 flowered, flowers well above foliage mass. Leaves medium width, bright green, upright, recurved at tips.

Flowers almost 4 inches in diameter, wide orange throat, slightly pointed upward, tepalsegs reflexed. Petepalsegs 3½ inches long, 1¼ inches wide, distal ¾, brazil red margined mars orange with large inconspicuous eye and veining, of Victoria Lake, orange base. Setepalsegs 3¼ inches long, ¾ inch wide, outer ¾ Dragon's Blood red margined madder brown with indistinct V-shaped, maroon eye spot. Reverse of both Brazil red margined orange. Very luminous with velvety sheen. Odorless. Holds color well in sun. Season last of June through July. (Dominion x Persian Princess).

Classic. 40 inches. Scapes sturdy, erect, 3 to 4 branched, 20 to 25 flowers borne about 1 foot above the foliage mass. Leaves upright, rather stiff, blue green.

Flower long tubular with wide throat and reflexed tepalsegs of thick texture, resembling an Easter Lily. Very fragrant. Petepalsegs 4 inches long, 1¼ inches wide, lemon yellow, lightening to picric yellow at margins with light green base. Setepalsegs 4 inches long, ¾ inch wide, same color as petepalsegs. An exquisitely formed patrician flower which holds its texture throughout the day and well into the night. (Hyperion x (Hyperion x Rajah)).

Companion. 32 inches, slender, upright, branched, 15 to 20 flowers. Flowers face outward and slightly upward. Leaves light green forming dense mass about 20 inches high around the numerous scapes.

Flowers long tubular with reflexed tepalsegs. Petepalsegs 2½ inches long, 1 inch wide. Outer portion vinaceous tawny, base lemon chrome with large indistinct tawny eye. Setepalsegs same color, without eye. Reverse of setepalsegs cacao brown. Buds are very distinctive, large, borne erect, warm reddish chocolate brown. Odorless. Free, early and abundant bloomer, very effective with Siberian Iris. Third week in May through third week in June. (Gold Dust x Brunette).

Conqueror. 32 inches. Scapes numerous, slender, erect, 20 to 25 flowered, flowers borne 6 to 8 inches above the foliage mass. Leaves bright green, wide, 24 inches long, upright, recurved at tips.

Flower widely open with reflexed tepalsegs. Petepalsegs 2¾ inches long, 1¼ inches wide, distal portion madder brown, inconspicuous eye of Vandyke red, base cadmium yellow, margins ruffled. Setepalsegs 2½ inches long, ¾ inch wide. Same coloring as petepalsegs, without eye. Very luminous despite the rich dark coloring. Holds color well in sun. Very free flowering. Middle of June to middle of July. (Persian Princess x [Modesty x (Dominion x Cressida)]).

Coral Bells. 24″; MLa; R4L; (Boutonniere x Sunny Morn).

Delicacy. 30″; MLa; Y4D; (Boutonniere x Pamela).

Double Eagle. 30″; M; Y4D; dble.; (Regal Lady x [Rajah x Golden West]).

Eric Junior. 20″; MLa; R7D; (Cressida x Rajah [self]).

Firecracker. 30″; EM; R7D; (Earlinna x Brunette).

Flames. 34″; MLa; R4M; (Cressida x (Rajah x self)).

Mabel Fuller. 36″; M; R7D; (J. S. Gaynor x [(J. S. Gaynor x Gypsy) x (Dominion x Cressida)]).

May Rain. 24″; E; Y5L; (Flavinia x Brunette).

Mrs. Charles Walgreen. 30″; EM; R7M; (Rosalind x [Gypsy x (Amaryllis x Golden West)]).

Mrs. Raymond Knotts. 36″; M; Y4D; (Vespers x Monona).

Primula. 42″; EMRe; Y4L; (Dominion x J. S. Gaynor).

Red Dot. 22″; EM; R8D; (Rajah x [(Bijou x Dominion) x (J. S. Gaynor x Rajah)]).

Ringlets. 30″; EM; Y4D; (Mrs. W. H. Wyman x Rosalind) x ([Dominion x J. S. Gaynor) x (Dominion x Cinnabar)]).

Rosario. 32″; M; R7L; (Rosalind x [(Cinnabar x (Dominion x Gypsy)]).

Sunny Morn. 34″; M; Y4L; (Mrs. W. H. Wyman x self).

Mrs. David Hall (Kraus, 1948); Myb. 2, p. 81; 30″; M; S8M; (Dominion x Amaryllis).

2. GENETICS AND BREEDING

THE CLIVIAS AT SCOTT'S FARM, GRAHAMTOWN

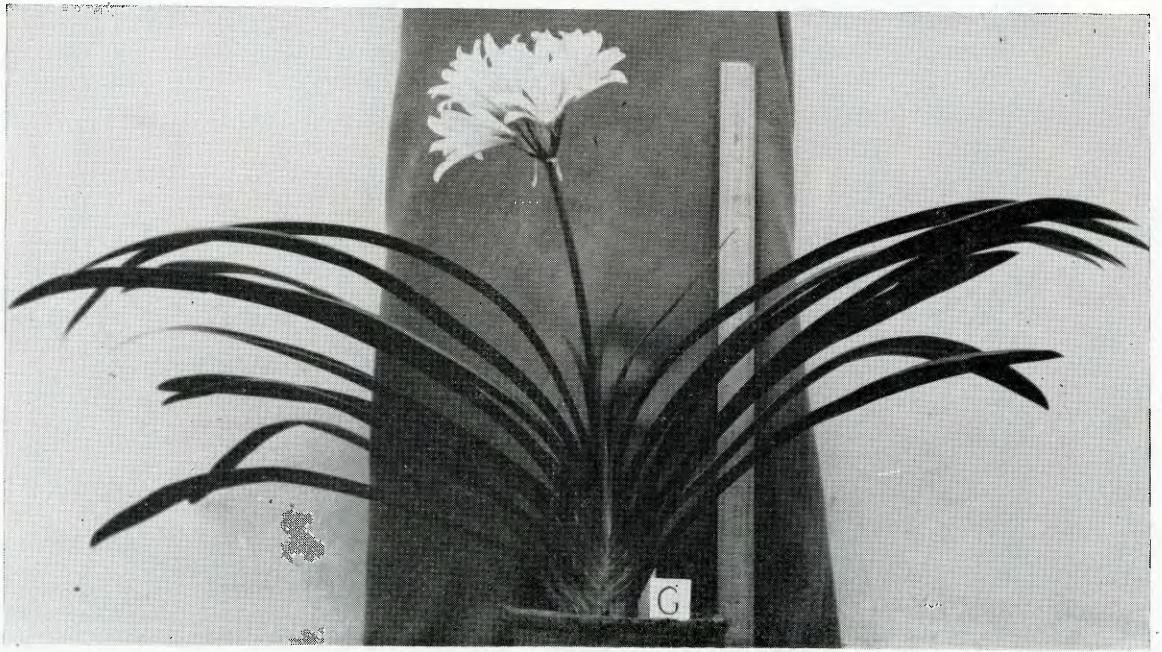
CYTHNA FORSSMAN,
Division of Botany and Plant Pathology, Pretoria

In the 1939 volume of HERBERTIA, Miss Blackbeard of Scott's Farm, Grahamtown, gave a short introduction to her *Clivia* collection. It seemed desirable to have some of her results recorded in colour and it fell to my lot to do the work. It seemed fitting also that the second volume of HERBERTIA to be dedicated to South African *Amaryllidaceae* should continue the story of the Scott's Farm Clivias, and it is hoped that that use may be made of my colour impressions. [Editorial note.—Unfortunately, due to post war conditions, it was not possible to reproduce the very beautiful color plate submitted by Mrs. Forssman. It is hoped that it may be possible to interest the Editor of LIFE magazine so that this fine color plate may be given to the public. It shows (A) a flower of original plant of *Clivia miniata* in garden at Scott's Farm; (B) a flower of hybrid, from Pietermaritzburg, Natal; (C) flower of *Clivia miniata* var. *flava,* from Pietermaritzburg, Natal; (D, E, F) flowers from progeny of the above and other parents; (G) fruit of *C. miniata* var. *flava,* and (H & K) fruit of hybrids, showing variations in shape and color. All of these are done most beautifully in color.]

Miss Blackbeard's Clivias must be seen to be believed. It was on a grey day that Mr. R. Story (Botanical Survey Officer) drove me down to Scott's Farm and the rain clouds were hanging heavily over Grahamstown. On our arrival, a tall woman of about my own age detached herself from a group of coloured men who were arguing and gesticulating over the corpses of three enormous Cycads *(Encephalartos).* She came towards us with outstretched hand and we were surrounded by and included in the warmth of welcome extended to any man, beast or plant, irrespective of degree of colour, who arrived at Scott's Farm. She had rescued the Cycads, she told us, from a garden which was being modernized. Nine men were needed to lift the branched veteran, seven had been enough for the others. Although they had been hacked off above their roots, she hoped they would again strike roots if she planted them in sand.

Then Hardy introduced himself by giving me a good bite on the ankle. He is a quiet, self-possessed bird with a nip for everyone except his beloved mistress. He had been brought to her by some urchins as an unprepossessing Hah-di-dah chick which had fallen out of its nest, and now he owned the place. The pair of owls, which had both turned out to be females, who were contentedly hatching some Bantam eggs, the wild duck on its nest among the reeds, the numerous dogs, fowls and geese did not dispute ownership with Hardy.

And then the Clivias, which in their off season live in a large rambling rush-house, were presented to us. They all started from *Clivia*



Clivia miniata var. *flava,* from Pietermaritzburg, Natal

Plate 319

Clivia miniata hybrid from Pietermaritzburg, Natal

Plate 320

Good example of flowering *Clivia* hybrid at Scott's Farm, Grahamtown

Plate 321

miniata, a stout hardy specimen planted in the garden by Miss Blackbeard's mother. The flowers are a deep orange-red and the petals are thick and leathery. Then *Clivia miniata* var. *flava* (Plate 319) was introduced from Pietermaritzburg, Natal, and then the crossing began. After that various hybrids were procured from Natal (Plate 320) and Zululand and the result is the wonderful show of exquisite blooms, ranging in colour from deep orange-red, through every shade of apricot and salmon-pink to pure cream (Plate 321). Some have white centers, some have striped centers and they have all been arranged on the stoep of the farm-house. With their dark green and shining strap-shaped leaves they made a picture that will live with me forever. *The painting of the Clivias.* My first feeling was of utter bewilderment. The weather was unpropitious and the time allotted to me would not allow of my ambitious scheme, so I decided to do one flower from each of the six main parents and then two or three of the most striking hybrids.

HYBRID **AMARYLLIS** IMPROVEMENT

WYNDHAM HAYWARD, *Florida*

When one considers the progress in the breeding of fine Hybrid *Amaryllis* made in the last three decades of the 19th century and the first 20 years of the 20th, and compares the extant records of the breeders' achievements, as evidenced by the products they created, which may be seen in photographs of the period in various old catalogues, horticultural magazines, etc., one has to come to the conclusion that the subsequent thirty years have contributed little to the work of Veitch and Ker and their contemporaries.

It might even be said that the breeding of hybrid *Amaryllis* has gone into a sad decline. The breeding, not the growing of these magnificent bulbs, which have formed the nucleus of many showy conservatory collections in the last 75 years.

Some other time we may be able to discuss with more careful consideration the decline in the culture of choice types of Hybrid *Amaryllis* since Messrs. Veitch, Ker, etc. dropped the torch of breeding this interesting and beautiful tropical American bulb.

Who wishes to delve into the botanical and horticultural background of our present-day Hybrid *Amaryllis,* which are being maintained on a high level of culture in only three or four countries today, can find much to interest him in the valumes of the botanical and horticultural papers and magazines of the period from 1870 to the present day, also in such specialized monographs as "Die *Amaryllis,*" published in German in 1909, the work of the late Henry Nehrling, pioneer Florida horticulturist and plantsman.

The well known, but now scarce veteran hybrid *Amaryllis,—A. xJohnsonii,* dates back to the late 18th century in England. There were several species available during Dean William Herbert's time, in the first half of the 19th century; in fact, in his "Amaryllidaceae," 1837, he

lists *A. aulica, A. calyptrata, A. psittacina, A. elegans* (syn.-*A. solandriflora), A. ambigua, A. breviflora, A. reticulata, A. belladonna Linn.* (syn. —*Hippeastrum equestre* Herb., *H. barbatum), A. stylosa, A. Reginae, A. glaucescens, A. striata* (rutila) and many varieties. Herbert discusses numerous hybrids, ("cross bred seedlings" he calls them) from the time of the original reginae-vittata cross which is alleged to have produced

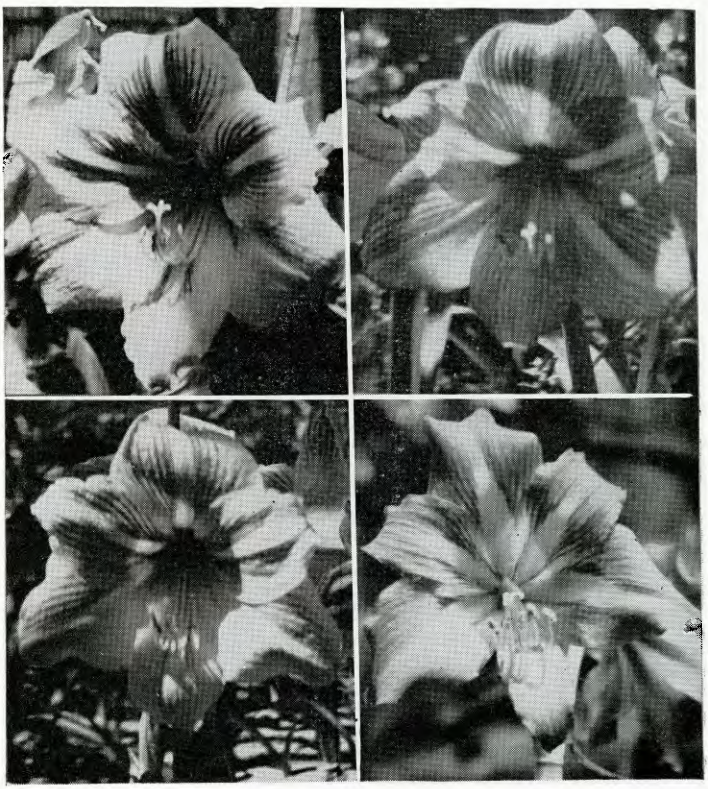


Fig. 191. Hayward Strain Hybrid *Amaryllis* shown in upper left & right, and lower left; *Amaryllis striata* hybrid from van Tubergen shown in lower right. All grown by Wyndham Hayward, Winter Park, Florida.

xJohnsonii, and reproves Sweet for "overwhelming" the natural species of this genus with a plethora of Latin-named mere crosses.

On pages 143 and 144 of his "Amaryllidaceae, "Herbert lists 31 recognized *Amaryllis* hybrids which had been given names up to 1837, starting with *A. xJohnsonii.* None of these hybrids with the possible exception of *A. xJohnsonii* remains in cultivation today. And we are not even sure about *A. xJohnsonii.* What we have under that name

today may be a seventh generation seedling of the original, or some other species or hybrid entirely.

Between 1837 and 1948, literally thousands of outstanding hybrid *Amaryllis* have had names given to them. It is the custom at many notable flower shows, such as the International Shows in New York and the Royal Horticultural Society shows in London, to apply a name to a fine type of Hybrid *Amaryllis* which receives some recognition or award at the shows. In the previous volumes of "Herbertia," there have been many valuable and beautiful named varieties of hybrid *Amaryllis* listed and described.

Back in 1934, perhaps the supreme named variety of Hybrid *Amaryllis* was a Heaton seedling named "President Roosevelt," which was voted "best flower" that year at the first annual show of the American Amaryllis Society, now the American Plant Life Society. Almost every grower, at various times has introduced certain fine types of *Amaryllis* under name. Some have had extensive catalogues of named varieties, as the late Luther Burbank, and only a few days ago the writer received a price list of named hybrid *Amaryllis* from an Indian nursery containing more than 75 varieties.

In the only catalogue of Luther Burbank that we have seen the small numbers of bulbs and offsets available were listed with price. In the Indian catalogue just at hand the prices range from 25 cents each for "Johnsoni" to $2.50 and more for selected types, but there is no indication how many of the bulbs of each variety are available.

So it may be said with justice that in no plant of similar outstanding horticultural merit, so worthy of wide culture and possessed of so much popular appeal, has there been such an ephemeral character to the named variety situation. Back in 1934 I. W. Heaton named his flower "President Roosevelt" and propagated the bulb by vegetative means, and it proved adapted to this type of multiplication. But in the years since then, the variety has virtually disappeared in the trade, so far as the writer is aware.

Doubtless the lack of an easy, scientific method of progagating the bulbs of hybrid *Amaryllis* vegetatively was a major factor in the checkered career of this horticultural favorite over the decades since *xJohnsonii* was created (1796-1810, according to various authorities.) However, this problem of vegetative reproduction of named varieties is no longer the stumbling block in building up stocks. Efficient and successful methods for cutting up bulbs and growing new ones from the pieces were worked out by Miss Ida Luyten in Holland and extended in treatments by I. W. Heaton, Dr. Hamilton P. Traub and others in Florida in the late 20's and early 30's of this century. Dr. Traub obtained as many as 90 bulblets by cutting up a single large *Amaryllis* bulb.

So—the problem today remains one of breeding, culture and vigor of the strain. Many fine plantings of hybrid *Amaryllis* have "gone bad" in Florida, and only the most intensive culture in greenhouses has brought the English and Holland strains to their present fine state.

We do not know enough about the cultural requirements of the hybrid *Amaryllis*, at least under outdoor conditions, as prevails today with 95 per cent of commercial hybrid *Amaryllis* cultures in Florida, Texas and California, where most of the bulbs are grown. What attraction for a grower is there to invest in choice European strains in large quantities for seed or parent stocks, if he knows that he may lose most of his imported bulbs in a few years under outdoor growing conditions, as so often happens both in California and Florida?

There are several avenues of approach for the serious-minded and scientifically inclined *Amaryllis* grower. If he considers that the constitution of the European bulbs has been undermined by generations of inbreeding and greenhouse culture, and this may very well prove to be a fact; the ambitious *Amaryllis* grower of the future might choose to return to the species, and go through the breeding experiments of Veitch and Ker and all the rest all over again with careful selection of handsome, vigorous types. This might work, but would take many generations of seedlings as it did in the first place. The most vigorous types of hybrid *Amaryllis* unfortunately are not always the most beautiful.

However, it must be stated, that there ARE vigorous types of hybrid *Amaryllis*. Especially in the bulbs commercially grown in Florida by the acre in the open sun, often in orange groves, as the Mead Strain, which resulted thirty years ago from two acres of *Amaryllis* bulbs grown by the late T. L. Mead of Oviedo for the market. He was the first large scale grower of hybrid *Amaryllis* in the United States, and obtained his breeding and seed stock from the late Henry Nehrling's collection of choice hybrid seedlings and imported stock. Nehrling imported the finest varieties then available from European hybridizers.

These ordinary Mead strain bulbs are grown by the thousands in Florida in the Norfolk sandy loam soils, right in the open air and hot summer sun, and they have to be tough to survive. Some of them grow to four and one half inches in diameter in three or four years and bring 40 or 50 cents each in dime stores. But the flowers in 99,999 out of 100,000 cases are not of show quality. They are hybrid *Amaryllis,* and to any lover of the hybrid *Amaryllis,* any *Amaryllis* is an interesting and attractive flower, but only a few are outstanding in color, texture, shape, etc.

In the September, 1948 issue of the Journal of the Royal Horticultural Society, the noted English horticultural writer, Charles H. Curtis, pays an over-due tribute to Robert Pearce, plant explorer and collector, in his article, "The House of Veitch" on page 286. Curtis relates that during Pearce's second expedition to South America for Veitch in 1865, the plant explorer collected among other things, *Amaryllis pardina,* and *A. Leopoldii,* both of which had an extremely important part in the development of the modern hybrid *Amaryllis.*

So the scientific breeder of tomorrow, who wants to raise a new and greater race of hybrid Amaryllis can go back to 1865, if he wants that, and send forth into the wilds of South America for the original species (it would not be such a bad idea as the writer would certainly like to see the famous *Amaryllis Leopoldii* in the "flesh" after so many years).

Or he could, and this is the writer's personal opinion, better spend his time breeding a new strain using pollen of the handsome, but weaker, inbred, and more delicate bulbs of the best European hybrids (Figure 192), on the flowers of the best available types of the tougher American outdoor-grown strains, such as are found in California and Florida by the thousands, and are sold in seed stores for a few cents per bulb, while their distant high-bred relatives are imported for a "carriage trade" in the bulbs which is willing to pay $2.00 to $25 each, such as the top quality bulbs are bringing today.

Fig. 192. Hybrid *Amaryllis*—pure white, from van Waveren, as grown by Wyndham Hayward, Winter Park, Florida.

Thus will be brought together the finest seedling and vegetatively propagated strains in the European trade and the tough, sturdy, sand-grown bulbs of the American commercial grower who raises them like potatoes and sells them according to size, not quality. Accompanying this article may be seen some snapshots of the writer's own strain of hybrid *Amaryllis*, bred along these suggested lines (Figure 191), which was approaching the fourth and fifth generation before World War II put a stop to the breeding experiments and projects at Lakemont Gardens for the "duration" and one year more.

These bulbs produced flowers four to the stem, with large, flat faces, broad petals, and rounded or pointed petal tips. No attempt was made to grow bulbs of a single shade together or cross bulbs of the same shades, as is the custom in Holland today where pure whites, scarlet, orange, "pink" dark red, salmon and sometimes a few other shades are offered, also seed of these shades. So successfully have the Dutch growers developed their lines of seedlings by shades that they are now selling "separate color" bulbs as soon as they reach size, without having seen them in bloom. In some cases where the color shades are not yet fixed, this proves dangerous, as bulbs of quite different colors appear in the progeny, but these are usually in small quantity. Of course there is always the possibility of a physical mixing of the bulbs or seed in the growing establishments through accident.

At this time the writer has two generations of seedlings coming along toward a further development of his pre-war breeding projects in hybrid *Amaryllis*. It is to be hoped that more *Amaryllis* enthusiasts (and they must be true enthusiasts as only a "fan" will give the time and trouble at this stage of the game that the task requires) will engage in *Amaryllis* culture with an enlightened background knowledge of the fine European strains and their history and cultural methods, and devote attention to new breeding projects, the development of sturdy, fast-growing bulbs, bearing strong bloom stems and good type blooms of attractive colors, which bulbs will lend themselves to easy vegetative propagation in the greenhouse or open air lathhouse, in warm climates.

There should also be research into the cultural side of Hybrid *Amaryllis*, to determine what their fertilizing requirements are, to maintain the bulbs for years in a healthy condition, also the desirability of various manures, types of humus, and chemical fertilizers in their growing. Insects and diseases have seldom proved a deciding factor in the failure of *Amaryllis* plantings, but more attention to these phases of the *Amaryllis* problem might reveal some surprises in the way of unknown nematodes, mosaics or blights which may be responsible for much of the grower's difficulties all unknown to him. We want plant explorers to bring in old and new species to provide new plant "blood." The hybrid *Amaryllis* is one of the world's most lovely and showy flowers, and can very well be on the threshhold of a new day in horticulture. We have tried to point out in this article a few of the problems and also possible avenues of solution for at least some of these. There are many other points which could be brought into the discussion, as the use of colchicine or X-rays, etc, to change chromosome numbers and increase the possibility of important mutations in the species and hybrids, the use of hormones, and the application of the whole gamut of the new organic chemicals to the physiology of the bulbs, but we will leave that for some one more versed in that data and say in conclusion that it is our hope that the impression gained will be one of personal tribute to the plant, which we love and grow in spite of its not-so-serious failings!

THE LUDWIG HYBRID **AMARYLLIS**

LUDWIG & CO., *Holland*

The firm of Ludwig & Co., in Holland, still continues to grow its excellent strain of Giant Hybrid *Amaryllis* as in the past. The bulbs produce at least two flower scapes per bulb, with from three to four flowers in the umbel. The flowers have a well-formed shape, and the colors are clear. The following is a list of the named clones:

Early White, pure white, very large flowers.
Snow Queen, pure white, early flowering.
Kaspar Ludwig, pure white, excellent for pots.
Nivalis, white, greenish throat.
Scarlet Leader, dark scarlet, strong grower.
Red Guard, beautiful red.
Franklin Roosevelt, dark red carmine.
Brilliant, dark red, enormous flower.
Orange King, orange red, splendid shape.
Cherry Red, color cherry red.
Pink Favorite, pure pink.
Fantasy, attractive rose, lighter throat, and tepal margins.
Liberator, salmon pink, light striped.
Salmon Joy, salmon orange, excellent.
Mona Lisa, delicate salmon.

The firm has recently produced a new strain of Mignon Hybrid *Amaryllis* from a cross between the large-flowered hybrid *Amaryllis* and *Amaryllis striata* Lamarck (syn.- *Amaryllis rutila* Ker-Gawler), producing scapes 22 inches tall. The bulbs are from 6—8 inches in circumference, and all give from 2 to 3 scapes per bulb, and usually carry 4 flowers per scape. The flowers are much smaller than the usual Hybrid *Amaryllis*, but are nevertheless very elegant for table decoration and other decorative purposes. The colors range from reds, scarlets, pink and salmon shades, striped varieties, and still others.

THE BULLER HYBRID **AMARYLLIS**

HAMILTON P. TRAUB

Under date of July 28, 1947, Arthur C. Buller of Dwarsriviershoek, Stellenbosch, Cape Province, South Africa, sent some excellent kodachromes of his superior Hybrid *Amaryllis* strain which were received too late for mention in 1947 Herbertia. We take this opportunity of reproducing four specimen photos representative of the large lot of kodachromes,—(1) the best white (Figure 193) produced so far, (2) two blooms (Figures 194 & 195) from a large group of new brilliant colors—male parent had background distinctly chrome-yellow shaded, and this has given the unusual brilliance to the scarlets and other reds, and (3) one bloom (Figure 196) from a recent lot of superior seedlings.

The kodachromes submitted by Mr. Buller show unmistakably that he has developed a superior strain of Hybrid *Amaryllis* which deserves

the attention it is receiving from the most discriminating *Amaryllis* breeders in other parts of the world. Mr. Buller apparently is a very modest man and we have not been able to obtain an article about his achievements from him. We are pleased however to be able to include the following account based on a report contained in a clipping from a local newspaper sent us by Mr. Buller under date of August 20, 1948,— Many hundreds of flower lovers from all over South Africa as well as those from overseas have during recent years become acquainted with the splendor of modern hybrid *Amaryllis* (syn.-- *Hippeastrum* Herb.) as

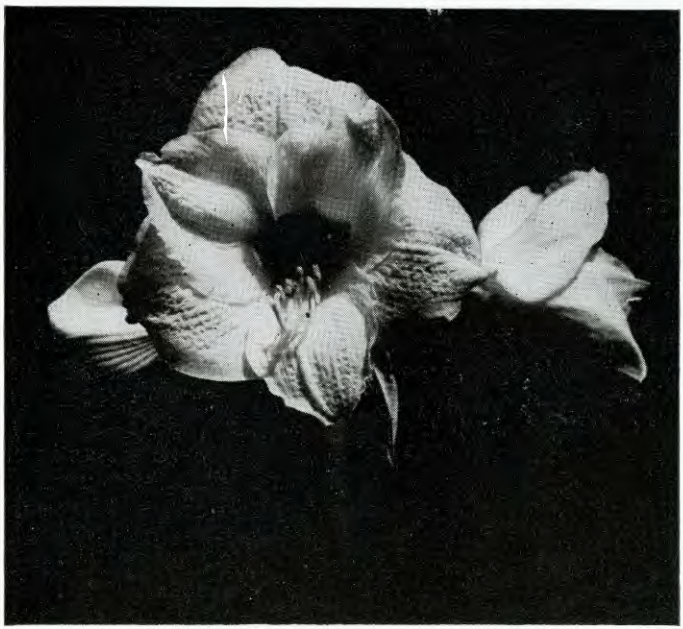


Fig. 193. Buller hybrid *Amaryllis*— best white seedling to date; note full form and fine texture. From kodachrome by A. C. Buller, South Africa.

raised by Mr. A. C. Buller of Dwarsriviershoek in the Stellenbosch district.

This exotic flower, whose forebears came from Mexico, the West Indies, Central America and South America, one species extending to west-central Africa (Prince's Island in the Congo estuary), has for many decades—in hybrid form—been one of nature's most showy subjects in the home garden and especially at larger spring shows in many countries. Those of the public who attended the October shows in Cape Town and Stellenbosch last year were surprised and delighted to see the unusual quality and coloring of these South African raised hybrid *Amaryllis* seedlings in shades from pure white through a wide range of scarlets,

flame scarlet, pink, rose and carmine and on to the deepest maroon crimson.

That experienced judge of plants, the director of public parks, Cape Town, Mr. van den Houten, commented at the time that these hybrid *Amaryllis* would be hard to match anywhere in the world.

It has taken Mr. Buller close to fifty years of "hobby" enjoyment to reach the present standard of quality and many thousands of hand pollinations and records have been made. With a view of testing out the critical judgment of overseas experts, a few of the newer plants have in recent years been sent over to the gardens of the Royal Horticultural

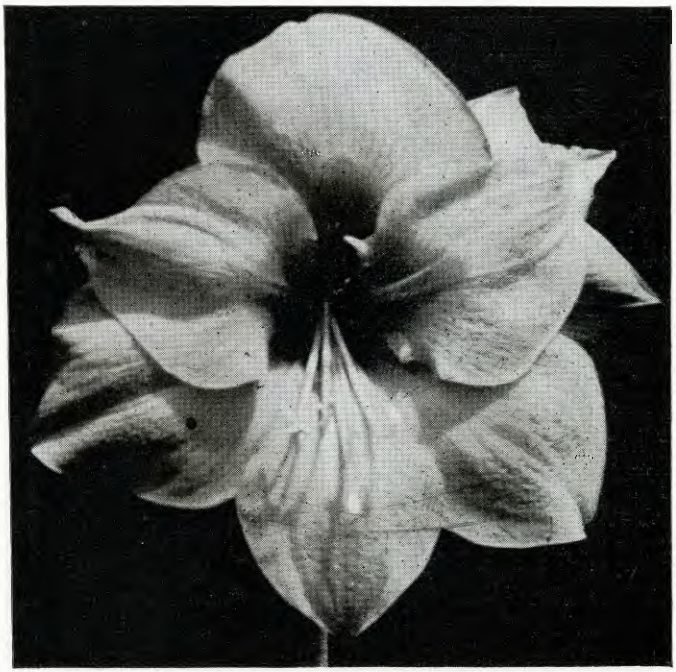


Fig. 194. Buller hybrid *Amaryllis*— flower of unusual brilliance; parentage described in text. From kodachrome by A. C. Buller. South Africa.

Society at Wisley, Surrey, England, where they have become acclimatised.

Three were shown at one of the large London shows last spring and all three were given an "Award of Merit." . . . The bulbs that Mr. Buller sent to England were later accepted by His Majesty, the King, for Windsor, where they will have the best possible care, and the flowering *Amaryllis* plants will be most skillfully exhibited by the staff of the Royal Gardens to the joy of many thousands. This is a signal honor for a South African hobby plantsman, a recognition of the quality strain, and an assurance of its preservation for future flower lovers.

AMARYLLIS BREEDING, SEASON 1946—1947

HERMON BROWN, *Chairman,*
Amaryllis Committee
Gilroy, California

For the past three years, it has been difficult to attend to my duties as a prune grower, and at the same time, to do as much as I had hoped to do with my hobby—*Amaryllis* breeding. Progress would have been more rapid had there been other *Amaryllis* growers near, with whom to exchange bulbs, seeds, pollen, and ideas. But, by importing new

Fig. 195. Buller hybrid *Amaryllis*— flower of unusual brilliance; parentage described in text; from same lot as Fig. 194. From kodachrome by A. C. Buller, South Africa.

stock from Holland, and exchanging pollen, and seed with growers in various parts of the U. S. A., and Australia, I have raised some five thousand new seedlings each year, and, therefore, have obtained many more good blooms each year (Plate 322).

My colors are mostly pure white, various combinations of white and red, down to pure red. Last year I had some pure pink, and pink and white. This year I increased my numbers of these same colors, and had a much larger lot of pure reds.

I can see improvement from my additions of Du Pont, and Holland stock, but these seem to lack the hardiness that my original stock had. However by selecting the best of these, as to form and color, when one or two years old, and planting them out in the field and leaving them until they come into bloom, I find that nature will eliminate most of the weaker ones, and many will become fine sturdy bulbs.

In my new breeding stock, I often find descriptions of color difficult, although I have the fine Royal Horticultural Society Color Chart.

Fig 196. Buller hybrid *Amaryllis*— selection from most recent seedlings; note rounded form and fine texture. From kodachrome by A. C. Buller, South Africa.

My last importation of Holland bulbs was pleasing, but the colors were not what I had expected. I am anxious to get some of the Leopoldii Type—pink, crimson and salmon selfs, as these will add variety to my collection.

I now have some seedlings from the late Mr. Ernest Braunton's collection, who started with *Amaryllis xJohnsonii* which he crossed with pollen received from Howard & Smith, Houdyshell, and Rice. Then being particularly pleased with his results, he continued his crossings

with pollen from my best pure whites and pure reds. Then a "Friend" sent him seed of the "Best *Amaryllis* in America." After Mr. Braunton passed away, his wife sent me some of the last seedlings from these "Best *Amaryllis* in America," and naturally I am looking forward, in eager expectation, to the time when these seedlings bloom.

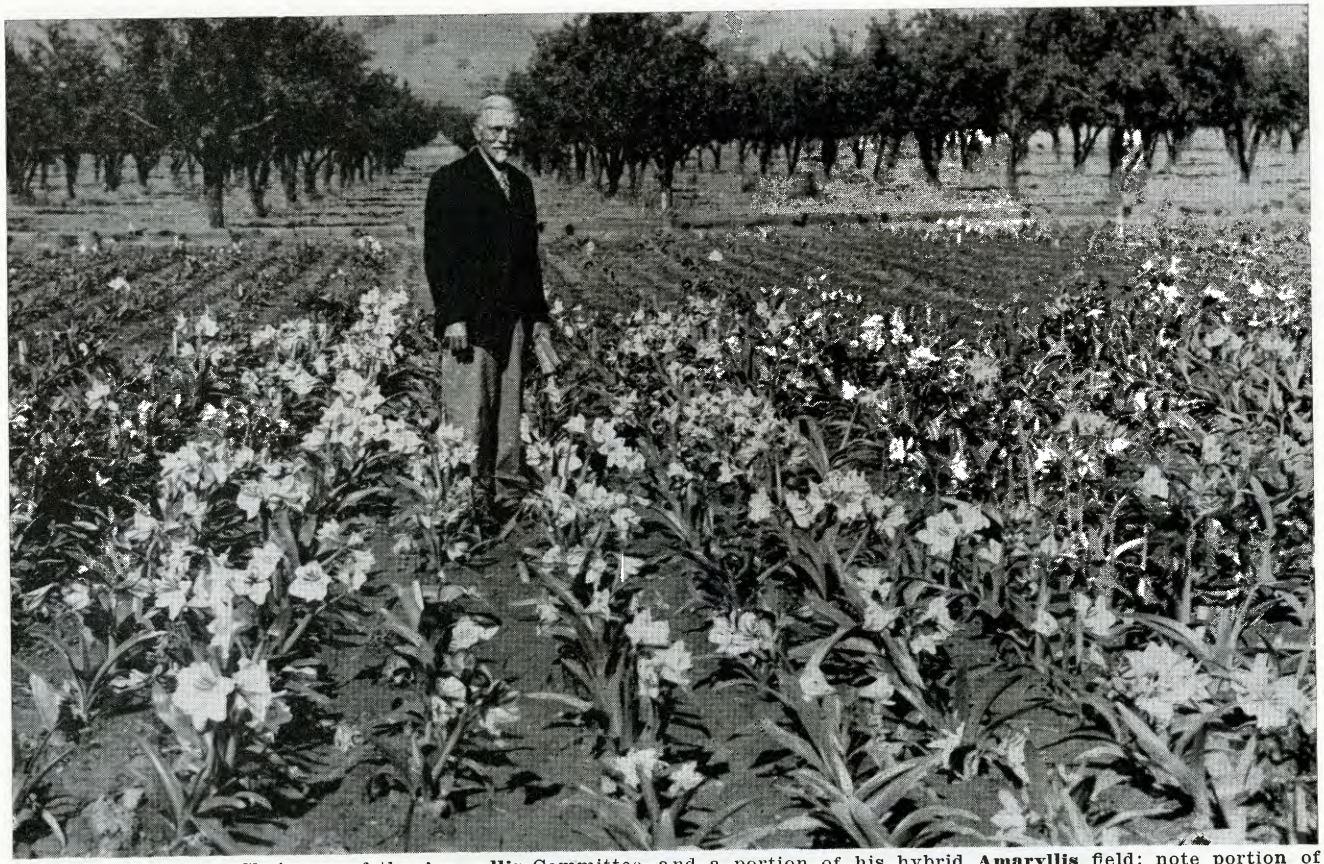
Mr. Wheeler, of Florida, very kindly sent me pollen from some of his best Leopoldii. Mrs. Strout, of Kentfield, California sent me a few seeds, and later she sent pollen which she had received from Mr. Bul-

Fig. 197. Hermon Brown hybrid *Amaryllis*—pure white, 8-inch diameter. Photo by W. M. James, California.

lock in Australia. All these with crosses from my own best stock, give me something to look forward to.

The great pleasure of the *Amaryllis* is the large showy flowers—beautiful shape, color and substance, and wonderful variety that hybridizing brings.

We have greatly missed the the kindly criticism and helpful suggestions of our friend, Dr. Traub, who used to visit us once a year during his recent stay in Salinas, Calif. Also it was disappointing to be obliged



Hermon Brown, Chairman of the **Amaryllis** Committee, and a portion of his hybrid **Amaryllis** field; note portion of prune grove in background.
Plate 322

by illness to forego our annual "Open House" during the latter part of April. In former years, many visitors have come to see the greenhouse display of my best blossoms. But some friends did come anyway, among them Mr. W. M. James, whose splendid illustrations appear with this article (Figures 197, 198 & 199).

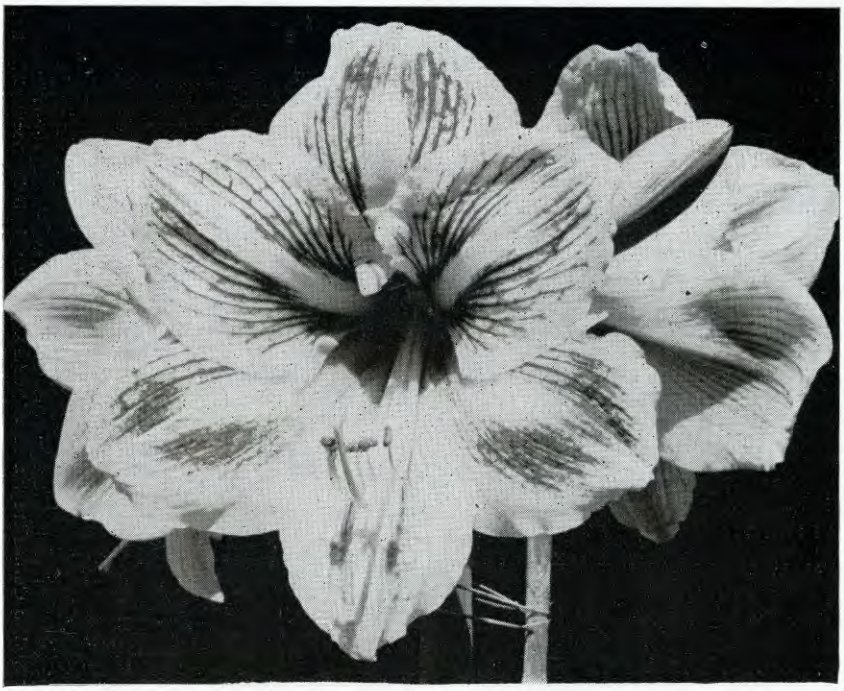


Fig. 198. Hermon Brown hybrid *Amaryllis*—White with red stripes, 8-inch diameter flower. Photo by W. M. James, California.

AN **HAEMANTHUS** HYBRID

L. S. Hannibal, *California*

Broad leaf *Haemanthus* have not been particularly popular when in flower due to the dowdyness of their blossoms. It is therefore with particular pleasure that the writer can report that these plants have some interesting possibilities. In 1944 the writer pollinated the little *Haemanthus albiflos* var. *Burchellii* (See Herbertia Vol. 10, P. 170) with pollen of the well known *Haemanthus Coccineus.* It was an easy cross to make and it was soon apparent when the seeds began to sprout some months later that something had happened; which is usually not the case with many attempted Amaryllid crosses.

The little *Burchellii* has small hairy leaves that are quite sensitive to sunlight. No coloring or red pigmentation is evident in either the leaves or flower. *Coccineus* in turn has the large flabby winter leaves that are semi drought resistant, and these bear pigmentation stripes along the under side of the keel. The flowers are more or less brick red, as is the five-valved spathe.

The hybrid is winter growing with leaves appreciably smaller than *Coccineus,* but just as hardy, excluding frost. No hair is noticeable and

Fig. 199. Hermon Brown hybrid *Amaryllis*— pink with edges of tepalsegs ruffled, 8-inch diameter flower. Photo by W. M. James, California.

only a trace of pigmentation can be seen at times. The dormant or rest period, when the plant sheds its leaves, lasts some six weeks only. Then, with the appearance of the new leaves a white bud emerges. As it developes the white gives way to a soft pink, then a coral red as the spathe opens. The flowers are inconspicuous but the anthers with their yellow pollen make a striking contrast with the coral red spathe valves and scape. In fact these parts seem to bring out all the desirable features

that are non existant in the scape or spathe valves of either parent.

It is to be noted that *Haemanthus albiflos* has been crossed with *H. coccineus* previously (Bot. Reg. 382, *H. Clarkei,* Hort.). However, since there are a number of white *Haemanthus* species in circulation (The writer has three distinct types) it is evident that the hybrid described above is in no way a repetition of the Clarke hybrid. The writer obtained his *H. albiflos* var. *Burchellii* from Perry Coppens, and he in turn brought it in direct from the Cape area. As far as known it has not been grown by European or American collectors previously.

In several respects all *Haemanthus* are unique since the spathe-valves are tending toward a development whereby they take over the function of the tepalsegs. It is not so evident with the species, but the deep pink tulip-shaped bud of the writer's hybrids appear to be anything but an Amaryllid, and it is a striking example of the evolutionary trends of this strange genus.

Unfortunately, and somewhat strangely, the hybrids are not inclined to produce offsets. To date none have appeared on a dozen bulbs. Perhaps this difficulty can be overcome as the F-2 generation evolves, but it is something that was not anticipated when one sees the rapid development of offsets from the little *Burchellii.*

FRAGRANT ALSTROEMERIAS IN FLORIDA

Mulford B. Foster, *Florida*

Definitely we are going to enjoy alstroemerias in Florida gardens and that time is not far off. For the past eighteen months there has not been a day without an *Alstroemeria* bloom in our garden. The blooming calendar runs like this:

December, January and February: *A. coryophyllaea*
March, April, May, June: *A. caryophyllaea* hybrids
June, July: *A. caryophyllaea* hybrids; *A. psittacina, A. nemorosa* and *A. inodora*
August, Sept. Oct. and Nov.: *A. caryophyllaea* hybrids

Of course, not all of these alstroemerias are fragrant but *A. caryophyllaea* and nearly all *A. caryophyllaea* hybrids *are.*

In this calendar I have not included the Pacific Coast (Chile and Peru) species such as *A. aurantiaca, A. chiliensis* hybrids, *A. ligtu* and others because they have made such unsuccessful attempts to live here. Some of them succeed in showing a few bright flowers on sprawling stems and as soon as the flowers have "smiled" their last attempt, the plants start to disintegrate at once as the bulbous roots have already started to rot away. They just do not like Florida, at least not South and Central Florida, and after several years of patiently trying to find and give them the right soil and other conditions, I, like these disappointed alstroeme-

rias have had to admit defeat. Undoubtedly the Pacific Coast species, in their native habitat, have moist, rainy conditions when it is cold.

I tried them out more times than I might ordinarily have done had I not wanted to cross them with the Brazilian species. Their range of clear colors was so nice that the combination seemed to be the ideal in view.

The unsuccessful results from cross pollination with the West and East Coast species was even more definite than any attempts to grow the Pacific Coast species. Each year I tried again and again to take pollen from the few flowers that managed to struggle to maturity but to no avail. Then, my good friend Harry "L-stroemeria" Stinson of Seattle sent me, on several occasions, generous bunches of lovely, colorful flowers from his garden for use in hybridization, but the results were nil. They just won't cross for me at least. They don't like Florida nor will they exchange genes with their Brazilian East Coast cousins.

We could be "upity" about it and say "well we didn't want any of them here anyway." But, instead we will be very happy over the fact that we will have just about every color in the rainbow in the hybrids of those that *do thrive* here.

The Brazilian species seem, so far, to be the best for Florida because in Brazil they have the rains in their hot seasons as we do here in Florida. Also, all of the alstroemerias which I have from Brazil are shade loving plants, preferring to be in acid soil. These prerequisites can be easily given in a Florida garden especially along the azalea beds where shade and soil are ideal.

I now have four generations of crosses using *A. coryophyllaea, A. psittacina, A. inodora,* and *A. nemorosa.* The range of color is wide and the results are most gratifying, both as to form and size. The foliage is dark green and holds up well when cut. In fact it lasts two weeks as a cut flower in summer weather and longer in the cooler months.

So far, I find that all the Brazilian species and hybrids move easily at any time of the year—even when in bloom!

Then too, we can feel a little smug about the fact that practically everyone of them carry at least a bit of that lovely carnation-like perfume which has been generously sprayed over all the children and grandchildren of the *A. carophyllaea* hybrids.

Mr. Stinson has written (Herbertia 1942, page 125) of his unsuccessful attempts to cross the Brazilian species, *A. psittacina,* with some of the Pacific species, and to date, I believe, he has been without fruitful results. Dr. Traub (Herbertia 1943, page 132) has attempted to cross *A. psittacina* and *A. haemantha,* also without success It is to be hoped that other growers will try whenever the opportunity presents itself.

In October 1948 I expect to again visit the areas in Brazil where alstroemerias thrive and I hope to find additional material to add to our happy alstroemeria "family" which is doing so well in our Florida gardens.

KODACHROME AND DAYLILIES— A TRIBUTE AND A WARNING

J. Marion Shull, *Maryland*

A number of plant breeders indicate almost overpowering reliance on Kodachrome for recording hundreds of seedling *Hemerocallis* for future reference and comparison in color, size and form. This is a rather fascinating idea but I wonder if the results warrant quite such an expensive method.

Now Kodachrome is a wonderful product and I seldom see a good slide that I do not marvel at the excellence of its definition. I have a slide for instance in which a grown young woman crouches among the flowers within the small space of 35 millimeters but so cleverly is the detail handled that I can see the perfect outlines of the nail of her little finger. In another a whole Iris plant is shown within that same limited space and yet I can see distinctly the stigmatic lip of an individual style branch facing the camera. That is high tribute to any photographic material.

And as for color, most colors may be rendered with great fidelity and satisfaction, but I wish to add a word of caution. We must not fall into the error of assuming that because it is a photograph it must of necessity be a correct color representation of the flower photographed. Sure, it looks like that, the unwary photographer insists. It's a PHOTOGRAPH and photographs don't lie! I took it myself! A very easygoing assumption on the part of the photographer but utterly unsafe to rely upon.

With all its perfections, Kodachrome is not equal to so gigantic a task under any and all circumstances. In all cases the exposure in relation to the light available must be exactly right if satisfactory results are to be attained, and in some cases not even the most careful relation of light to exposure will turn the trick. Suitable filters will sometimes help, but no filter serves for every problem in color differentiation.

Some years ago I had occasion to record in Kodachrome the bloom of *Oenothera* or Evening Primrose being grown by the thousands at Princeton for scientific purposes. Involved were an extremely luminous yellow, the normal leaf green, and the brilliant red of unopened buds. Any exposure that would tender the greens or reds would so greatly over expose the yellows that they came out practically white, losing all the delicate nuances between sulphur, lemon and old gold that were really there. I could record these things in my water color paintings, but alas no white reflecting surface could possibly record the luminosity found in the Evening Primrose. This handicap is the bane of every artist who tries to paint on paper or canvas the colors that Nature displays to him on every side. The brilliance of Nature is entirely impossible to him and can only be suggested by whatever subterfuge he has at his command.

I have photographed my own *Hemerocallis* clone Cherokee Maid which I describe as purplish bronze and the best-timed Kodachromes

of it give a very good rendering of it when thrown on the screen—but I have had this same variety rendered as the most wonderful bright crimson, as brilliant and clear as the best red rose ever grown. Such a daylily would be beyond price did it really exist, and my photograph insists with all its magnificent detail that such a one does exist, but I know better. It all came about through a very slight under exposure, and I can produce any number more in the same way at will.

Kodachrome slides will be a good recording of form, of carriage maybe, and of comparative size, but no Kodachrome of a *Hemerocallis* can safely be accepted at its full face value as to color unless or until the viewer has had opportunity to look upon the flower itself and compare the slide for accuracy of color rendering.

NEW **HEMEROCALLIS** HYBRIDS WANTED

GEORGE GILMER, *Virginia*

The midseason yellows of all shades have been developed so far that there appears to be little hope of great improvement in them, except by developing new forms. However, there is much room to improve early and late yellows.

I now have a new midseason yellow on test before introduction for a hybridizer which is triangular in shape. Every visitor has been pleased with it. Some say it looks like a Japanese iris but most say it looks like an orchid. It is a decidedly more distinct break in form than Wau-Bun but very compact with large broad curled petals. When released it should be used to breed a new type of all colors, early midseason and late. The Wau-Bun type is now available in Taruga, a little light yellow, Theodore Mead, a deep golden yellow, and Rose Gem with rosy petals. I have not seen that type of bloom in any pinks or reds and in no very early or late yellows.

Midseason reds have been greatly improved in the last five years. For some ten years Vulcan was my best red. Now there are at least a dozen better. There are yet few good early and late reds.

There is much chance to improve pinks of all shades. Most of them fade in the afternoon sun. Most have narrow petals. We need fadeless pinks in a variety of shades and broad petals, long twisted petals like Wau-Bun and triangular shaped flowers blooming early midseason and summer.

So called purples have been on the market for years. Of these the nearest true purple I know is Purple Waters. It needs more blue to be a true purple. I have one on test for a friend that in the early morning is a true purple—a dark rich blue purple like a pansy, a truly remarkable break in color but the blue fades. It is a wonderful stepping stone to new and finer purples.

There are a lot of good bicolors. The possible combinations of colors are endless. There are also charming blends. How many more are possible no man knows.

Many of the plants I hope others will create may have been already produced. I have tried to get from ten to thirty of the new best ones annually. But no man can keep up with all of the new ones registered unless he has practically unlimited money and plenty of time.

CROSSING POETAZ **NARCISSUS**

W. R. BALLARD, *Maryland*

Among the older varieties of *Narcissus* which I have had naturalized for several years are a number of clumps of Poetaz varieties, mostly Elvira, but also including one or two others not markedly different in appearance. I have never been successful in getting seed to set on these varieties, so I decided to try pollen of these on other types. Beginning in the spring of 1943 and every year since I have tried various combinations. Some of these have been repeatedly made. I have now piled up quite a respectable list of varieties which, under my conditions, have consistently failed to set seed.

These varieties are: Ada Finch, Beersheba, Ben Hur, Bodilly, Cheyenne, Daisy Schaffer, Dawson City, Firetail, Forerunner, Gallipoli, Golden Beauty, Golden Perfection, Golden Queen, Golden Sunrise, Great Warley, John Evelyn, Lady Hillingdon, Lovenest, Lucinius, Mayflower, Moonshine, Mrs. R. O. Backhouse, Odorus gigantea, Porthilly, Robinhood, Roxane, Sheresade, Shot Silk, Silver Salver, Sonja, Suda, Sunrise, Thalia, Tresserve, Tunis, Whiteley Gem.

On the other hand I have had one wee bit of encouragement. In the spring of 1947 four flowers of Salembo were pollinated. Three of these developed pods and from these 23 seeds were harvested. Again in 1948 this cross was repeated. Eleven flowers were pollinated, three pods developed and 26 seeds were secured.

I still have a number of combinations which I plan to make using these Poetaz varieties as the pollen parent. I am hoping to find other congenial crosses to add to the one success so far.

It is quite possible that pollen from other varieties of the Poetaz group would give more promising results but I have not tried them. If the pleasing fragrance of some of these varieties could be added to other types, it would be quite an acquisition.

FURTHER INFORMATION ON THE GENETICS OF PINK DAFFODILS

(a) FOREWORD

EDGAR ANDERSON,
Geneticist to the Missouri Botanical Garden, Englemann Professor in the Henry Shaw School of Botany of Washington University.

Mr. Guy Wilson, in the accompanying note, has filled in the preliminary account which Earl Hornback and I put together several years ago. In it we showed from data taken in the De Graaff breeding plots, that in daffodils the pink tone of color (but not color itself) was linked with narrow perianth segments and a narrow, straight-edged crown. As the result of this demonstration we postulated that the pink daffodils are recombinations of brightly colored cups from *Narcissus poeticus* with a pink color tone from some other ancestor with a narrow trumpet and a floppy, poor quality perianth. Since we observed an occasional sepia-pink browning in aging *N. moschatus,* we suggested that this species might be the source of the pink tone, a suggestion which came the more readily since we knew *N. moschatus* to be in the ancestry of several plants which had given pinks.

Mr. Wilson now points out that *N. muticus* also fulfills these same conditions and is also known to have been in the ancestory of some pink daffodils. He suggests that the pink tone may have come from *N. muticus* (= *abscissus)* or from both *N. muticus* and *N. moschatus.* On the basis of my limited knowledge I would suspect the latter hypothesis to be more likely. *Narcissus muticus* and *N. moschatus,* according to Barr, both come from the Pyrenees. Since they have the same general trumpet shape it would be highly probable, coming from the same area as they do, that they have many other genes in common, including the basic factor for pink color tone. On a white background, with few genes for color, (as in *moschatus)* this would give us a white flower, faintly tinged with sepia-pink as it fades. On a strong yellow background, (as in *muticus)* it would give us a yellow trumpet, distinctly buffy on the inside.

From the pedigrees listed by Mr. Wilson, and the additional information contributed by Earl Hornback and by Jan De Graaff it will be seen that each of these species is known to have entered into the ancestry of many of our pink daffodils. While none of the pedigrees gives us undisputable evidence either for or against any particular hypothesis, they all agree with the postulate that brilliant color comes in from *N. poeticus* and that pink color tone is supplied by *N. muticus* and *N. moschatus.*

(b) COMMENTS ON MESSRS. ANDERSON & HORNBACK'S GENETICAL ANALYSIS OF PINK DAFFODILS

GUY L. WILSON, *Northern Ireland*

The AMERICAN PLANT LIFE SOCIETY has asked me for comments on a pamphlet entitled "A Genetical Analysis of Pink Daffodils" by Edgar Anderson and Earl Hornback. I had already received this pamphlet from a Canadian correspondent to whom I wrote a letter of comment, a copy of which I sent to Mr. Jan De Graff, of the Oregon Bulb Farms, asking him to pass it on to Mr. Hornback. Much, though not quite all of what I shall say now was contained in that letter.

I don't feel fully convinced that the authors of this paper are entirely right in their deduction that the original source of pink colouring is *Narcissus poeticus* and *Narcissus moschatus*. It may well be one source, but actually I think that *Narcissus abscissus* or *muticus* is just as likely to be an original source as *N. moschatus*. Of course I think that the red colouring originating in *Narcissus poeticus* and diluted by successive generations of breeding with other species and hybrids especially white things, is still probably the major ingredient of the tints of pink that we now see in recent hybrids, but it seems to require combination with some other factor or factors to develop it or bring it out, and I think that *N. abscissus* probably contains one of these factors. *Narcissus abscissus* or *muticus* is of course a wild Perynean yellow trumpet. It has a peculiarly narrow straight sided smooth edged stove pipe type of trumpet, and nearly always a rather narrow and poor perianth; Messrs. Anderson and Hornback observe that it is clear that pink is linked with these factors, which however in their consideration of the subject they doubtless trace to *N. moschatus*, but they can equally be inherited from *muticus*, or perhaps from a combination of both. I manage to get a few blossoms of the wild *N. moschatus* here every spring, but have never noticed the faint tints of pink or light purplish brown as the flower fades, which Messrs. Anderson and Hornback have attributed to it, but what appears to me most significant about *N. muticus* is that there is a trace of buffness in its yellow colouring. Another distinct feature about *N. muticus* is that the plant has broad flat foliage quite distinct in character to the narrow foliage of *N. moschatus* or of other wild trumpets such as *N. hispanicus maximus* and the various forms of *N. spurius*. *Narcissus muticus* is, of course, somewhat variable as are others of the wild species. Many years ago the late Henry Backhouse, brother-in-law of the late Mrs. R. O. Backhouse of Sutton Court, Hereford, and son of William Backhouse of early Daffodil fame, sent me a few bulbs of a broad petalled form of wild *N. muticus* which he had himself collected in the Pyrenees. I raised a few seedlings from this and the warm buff tone was quite apparent in their colouring.

I am inclined to think that the bicolor trumpet Weardale Perfection is one of the principal ancestors of pink crowned things. Weardale Perfection has just a trace of warm creamy buffness in the pale yellow of its trumpet, and I think also in the white of its perianth, which is

noticeable when compared with other more clear toned flowers. I speak from memory as I have not grown it for many years, but I remember being very definitely aware of this. I have no idea how Weardale Perfaction was bred, but think it very probable that its pedigree would go back on one side at all events to *N. muticus*. The Leedsii variety Lord Kitchener was bred by the late Mrs. R. O. Backhouse from the old Leedsii Minnie Hume by Weardale Perfection. Lord Kitchener in its time was well known as a quite remarkable seed parent for giving pink crowned things. The first outstanding one that I remember appearing was a flower called Miss E. M. Bowling, which was shown by Mr. W. B. Cranfield at the MIDLAND DAFFODIL SOCIETY many years ago and there caused a great sensation as it was, for those days, a good flower with a well built perianth, while the crown had a very distinct and well defined pink frill. This flower came from Lord Kitchener by pollen of another white or almost white Leedsii named Anthea, of which I do not know the breeding. Mr. Cranfield's bulbs subsequently suffered from a bad attack of eelworm before the control of this pest was understood, and he most unfortunately lost the entire stock of Miss E. M. Bowling. The well known variety Suda came from Lord Kitchener by pollen of Nevis, and there have been others from Kitchener which I cannot at the moment recall.

The writers of the pamphlet say that Will Scarlett is known to be one of the parents of the pink crowned Mrs. R. O. Backhouse. I have heard that Mrs. R. O. Backhouse was bred from Lord Kitchener by Will Scarlett, but do not know whether this has been definitely confirmed, but I think it quite probable. Now Will Scarlett was bred from *N. muticus* by pollen of *Narcissus poeticus* Poetarum, so if my guess is correct that *N. muticus* is somewhere behind Weardale Perfection, the Pink Leedsii Mrs. R. O. Backhouse has a double dose of *N. muticus* in its ancestry. Of course Minnie Hume, the mother of Lord Kitchener, must almost certainly trace back to *N. moschatus* on the white trumpet side of its pedigree.

I can recall that years ago when I grew Weardale Perfection I had a few very rich self yellow trumpet seedlings from it. I cannot recall their pollen parent or parents at the moment, but I clearly remember that several of them showed a very distinct deep rather old gold or orange rich tone of colour due to this underlying buffness. As they were not very good flowers I have long since discarded them.

I have often said that on the whole I think it was a pity that Will Scarlett ever appeared, as it transmits bad faults to successive generations of its descendants, one of which is muddiness of colour, especially in the perianth, which of course traces back to the rather muddy yellow of *N. muticus*. This fault is not always apparent but in the case of many of the things with highly coloured cups which are descended from Will Scarlett it is there.

One of the first slightly pink toned things which Engleheart produced was a thing called Rosary; the small original stock of this he sold to the late Brodie of Brodie. This flower was practically a trumpet with white perianth and the trumpet very slightly flushed with warm

shell pink. I don't know how it was bred, but should certainly guess Weardale Perfection to be behind it. I think Engleheart used Weardale Perfection and probably also Lord Kitchener. Weardale Perfection had a tendency to a mild form of virus or mosaic which showed as a faint striping in the foliage. Rosary is also very prone to this. Rosary has the *N. muticus* type of foliage, rather than the *N. moschatus* type. Weardale Perfection had also broad foliage. Mr. C. E. Radcliff of Hobart, Tasmania, who at the moment I think probably leads the world in the production of pink crowned Daffodils, has I know made fairly extensive use of Rosary in the earlier stages of his breeding. I have several of his pinks here, such as Pink O'Dawn, Dawnglow, Rosario, and one or two others of more or less trumpet type. They all have the broad type of foliage. Dawnglow, which was a cross between Rosary and Pink O'Dawn is a bicolor trumpet, with a very strong buff tone, whilst Rosario, which was bred from a Leedsii named Pinkie by pollen of Rosary is a really lovely flower of trumpet charcter, with pure white perianth of good breadth and quality, the ground colour of the crown being cool pale primrose overlaid and flushed throughout with delicate and real rosy pink. These things are scarcely long enough established here to estimate their true character. Dawnglow seems to show a faint mosaic like Rosary and is extremely slow of increase. Rosario so far seems a definitely better doer.

One of the brightest and purest bits of pink we have yet seen is the little flower Wild Rose which was bred from Mitylene by pollen of a white Leedsii of my raising named Evening. Evening is descended from a large white Leedsii of Engleheart's raising three generations back. Engleheart's flower may well have had Weardale Perfection somewhere behind it. I have had one or two quite strong pink cups out of Mitylene by Evening myself and others out of White Sentinel by Evening. Engleheart raised Mitylene and White Sentinel from the little old Barrii Beacon (which gives such remarkable seedlings) by pollen of some large Leedsii. A plant geneticist who corresponds with me has made a guess that the other parent of Mitylene may quite likely be Lord Kitchener, but I don't know that this is confirmed. He thinks that the other parent of White Sentinel is not the same as that of Mitylene.

There is quite a nice flower named Rose of Tralee raised by Mr. J. L. Richardson of Waterford. This came from White Sentinel. Mr. Richardson thinks it to be self fertilized White Sentinel, but of course a grain of pollen may have reached White Sentinel from some other source. Rose of Tralee develops quite a nice pink, but it fades out white in the end. Last spring Mr. Richardson showed a really remarkable fine pink crowned flower of excellent form and very smooth quality, the crown being a definite uniform pink throughout, which he said came from self fertilised Rose of Tralee.

Another thing occurs to my mind. In early days there was a little white trumpet named Apricot, which was quite a small flower and I think had a fairly straight smooth edged trumpet, definitely flushed with apricot colour. This variety appeared I believe about the same

time as Madame De Graaff or perhaps earlier, and I rather think its originator was the original firm of De Graaff in Holland at that time. I have no clear recollection of it as I never grew it, and I think it had a poor constitution, but I can dimly recall seeing it more than once in an exhibit put up by Messrs. Barr and Sons of Covent Garden, London. I have sometimes wondered of late whether it could have been a cross between *N. moschatus* or one of the old white trumpets that are closely allied to *N. moschatus,* and *N. muticus.* I have never heard that anything of interest has been bred from it.

The question has been asked as to which crosses have given me pink Daffodils. I fear it would take too much time and space to trace all these as I have had quite a number. A few, however, may be mentioned, e. g. Mitylene x Evening and White Sentinel x Evening. One of my best a few years ago is Lisbreen, which came from Mitylene x Evening. I have had flowers with deeper colour than either parent bred between Pink O'Dawn and Lisbreen. White Sentinel x Wild Rose; Rose of Tralee x Evening, and Rose of Tralee x Wild Rose, fairly strong colour (but form not quite good enough. Of course only small batches were raised. Nautilus (Radcliff) x Carnlough. Suda x Evening. Clava x Evening. While a large Leedsii which is the grandchild of Fortune, mated with such things as Evening has given some pinky crowns. Cushlake, a quite small 4-B Leedsii which is a seedling from Brodie of Brodie's tiny Fairy Circle which has a little pinky orange rim, was crossed with Brodie's Leedsii Dava (Bred from Leedsii Kingdom by White Emperor). From this cross, i.e. (Cushlake x Dava) I got a thing I call Interim, which is a vigorous decorative type Leedsii with a very strongly marked salmon pink rim.

Unexpectedly my giant white trumpet Broughshane appears to carry some factor for pink, as when I used its pollen on a Dutch Leedsii called Gracious, amongst the resulting batch of seedlings there came several with a good deal of quite strong pink in their crowns, but they lacked other good qualities. I also had a large seedling from the little 4-B Silver Coin by pollen of Broughshane, which showed a definite tint of pink at the frill of its wide crown, but as it was an ill balanced flower I did not keep it. Broughshane of course has Weardale Perfection in its pedigree. An even more surprising flower came in a batch of seedlings bred between Trostan (The mother of Broughshane) by pollen of the white trumpet Beersheba. This unexpected flower had a pure white perianth and a full trumpet which is pale pink throughout, a rather poor and muddy pink, but quite definitely pink. I fancy that Weardale Perfection is behind Trostan. I know that Beersheba came from White Knight, but don't know the other side of its pedigree. A good many years ago I raised a seedling, No. 18/130. This came from a white trumpet Leedsii by pollen of Engleheart's large tall Leedsii Tenedos. It was a large white flower, which developed a quite strong tint of very pure rose pink in the crown, but as this faded out very quickly after being visible for only a day or two, I did not keep it. I have heard from other raisers that Tenedos has given tints of pink. It is thought that Tenedos has probably got Weardale Perfection in its ancestry.

(c) COMMENTS ON ORIGIN OF PINK DAFFODILS

EARL HORNBACK, *Oregon*

I am inclined to agree with Mr. Wilson that the case is not proven. The only way to prove it would be to make direct crosses between *Narcissus moschatus* and *N. poeticus* species, and even if this failed to produce pink nothing would be decided, as some other factor might be suppressing the pink.

I have never agreed entirely with Dr. Anderson's theory, because too much is taken for granted and not strictly proven—of course the article was not intended to be the final word on the subject as shown in its title by the use of the word "preliminary." While Mr. Wilson presents a strong case for *N. muticus,* he does nothing to disprove Dr. Anderson's theory either. In other words, it would be impossible to prove beyond doubt that *N. moschatus, N. Poeticus* and *N. Muticus* are not all concerned in the ancestry of every pink daffodil in existence at the present time. The only possible way to settle this question would be to produce pink from species crosses.

Personally, I would relegate the whole question to the realm of minor matters and take up some more important phases of the pink daffodil problem.

First, the existence of a gene or genes carrying "pink" as a definite color seems to me to be adequately proven. That we are dealing with only one "pink" whether we refer to Wild Rose, Mrs. R. O. Backhouse or Lisbreen seems quite clear to me. We have grown about ten thousand seedlings with Mrs. Backhouse as the male parent, and have seen seedlings of every shade and variation of pink that occur in any named varieties, and some shades that do not. It seems obvious that all these different variants of color are due to the influence of the same gene, or genes.

Second, the influence of other factors on the pink coloring, the principal one being yellow coloring. Practically all pink cups also contain more or less yellow, which in some cases must fade out somewhat before the pink is visible at all. The so called "muddy" pinks are an example of a yellow that does not fade sufficiently. If the yellow in the cup is a bright, or non-fading yellow the pink may be unable to show at all, though it be present. Less often we see some red in the combination, giving glowing apricot-orange shades. There are probably dozens of other factors, of which we know little, that modify the pink coloring.

Third point of interest is that the pink occurs principally on the inside of the cup. To show it to best advantage, then we should breed for wide cups more than trumpet types.

Fourth, regardless of the original source of pink there is a definite linkage with several characteristics usually referred to as undesirable. These are, narrow perianth segments, poor substance, short stems and straight cups. While we have been able to overcome these difficulties singly, they have never been overcome as a group in any single plant to the extent that they have in other groups of *Narcissus.*

The above points seem to me to be of much greater importance in breeding pink daffodils than finding their basic ancestor. For all we know *N. moschatus* and *N. muticus* may be descended themselves from a common ancestor, or perhaps one is the ancestor of the other.

Another very interesting thing about pink daffodils is in their resistance to common mosaic. Most varieties show about the same degree of resistance as *N. poeticus;* the virus appears in a mild form and spreads very slowly, or in some cases does not appear at all. The exceptions to this rule however, show the disease in a violent form and the spread is very rapid. A few show a mild form with rapid spread (mostly Rosary and descendants) or the violent form with slow spread. This gives us

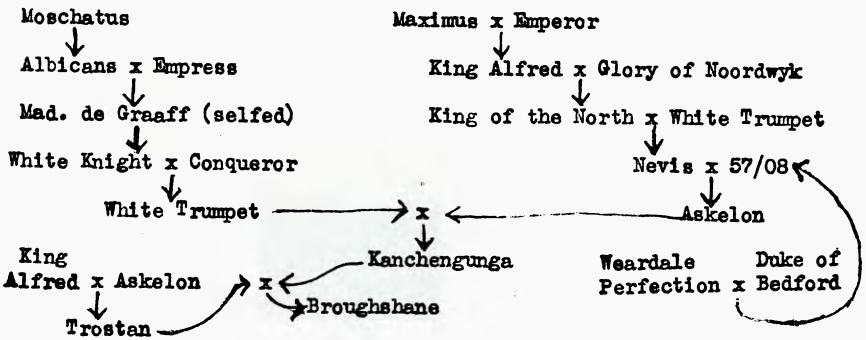


Fig. 200. Pedigree of hybrid *Narcissus*—Broughshane

one more link with *N. poeticus* but does not indicate much concerning the other side of the family tree.

One real exception I have to take with Mr. Wilson's remarks is his though that "pink" in daffodils must be a dilution of the red occuring in *N. poeticus.* If this were true we should get some red cups from crossing two pink varieties. This has never happened to us. Instead pink x pink gives a high percentage of pinks with the balance of the seedlings mostly pale yellow. Probably if we had really pure pinks to breed with, I mean pinks without the yellow coloring in combination, pink x pink would give one hundred percent pink.

N. muticus = *N. abscissus,* a bicolor of strongly contrasted white perianth and yellow cylindrical trumpet, and quite unmistakable because of its "clipt" appearance of trumpet. Mostly unmixed with other trumpet forms and does not vary a great deal.

(d) NOTES ON THE ORIGIN OF PINK DAFFODILS

JAN DE GRAAFF, *Oregon*

As to the parentage of some of our old daffodils, originated by my Grandfather: Apricot is *N. absissus (muticus)* x *Albicans,* and *Albicans* is again a seedling from *Moschatus* so that does not bring us much further. Apricot was still grown in Holland until a few years ago and I have a few bulbs of it here, still vigorous and healthy. We had another one in the old days, called Watteau.

From Apricot we raised one called "Rosy Trumpet" and this is still in cultivation in Holland and here. It is a deeper pink but has lost substance. Then there is a group raised from seedlings like Rosy Trumpet, things such as Rosabella and Sublime. All of them have the strong admixture of yellow with the pink and they are more salmon or buff than pink in coloring.

I have just looked up the pedigree of Broughshane (Figure 200).

And Broughshane gives pink trumpets in its offspring and one could, I suppose, make a case for either *N. abcissus* or *Moschatus* as the one carrying the pink gene or perhaps both.

3. AMARYLLID CULTURE

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

NOTES ON AMARYLLIDS CULTIVATED IN THE TRANSVAAL

J. Erens, *Head Gardener,*
Division of Botany and Plant Pathology, Pretoria

There is still a great deal to be learnt about the cultivation of *Amaryllidaceae* in the Transvaal, particularly those which are introduced from other Provinces, where they grow under rather different climatic conditions. In spite of the difficulties it has been possible to grow a number with satisfactory results. The genera will be dealt with in alphabetical order.

AMMOCHARIS CORANICA

This has a very wide distribution and is to be found in most parts of the Transvaal. The plants grow in colonies or singly, mostly in flat open country amongst grass in sandy red or black loam, which is usually very firm around the bulb. The photograph (Fig. 201) gives an idea of their habit of growth. The leaves differ a great deal in length, depending on the moisture content of the soil. In wet seasons the leaves are much longer and more luxuriant, whereas in dry seasons they shrivel up and disappear entirely during winter. During the past season *Ammocharis coranica* has been in full flower due to good general rains, and seeding has been prolific. Seed germinates readily but the bulbs take from four to six years to come into flower under cultivation. Apparently only a relatively few seedlings come to maturity in the veld as one finds mainly full-grown bulbs.

AGAPANTHUS

The species of *Agapanthus* may be divided into two groups:

(1) Evergreen *(Agapanthus africanus* falls under this heading.)

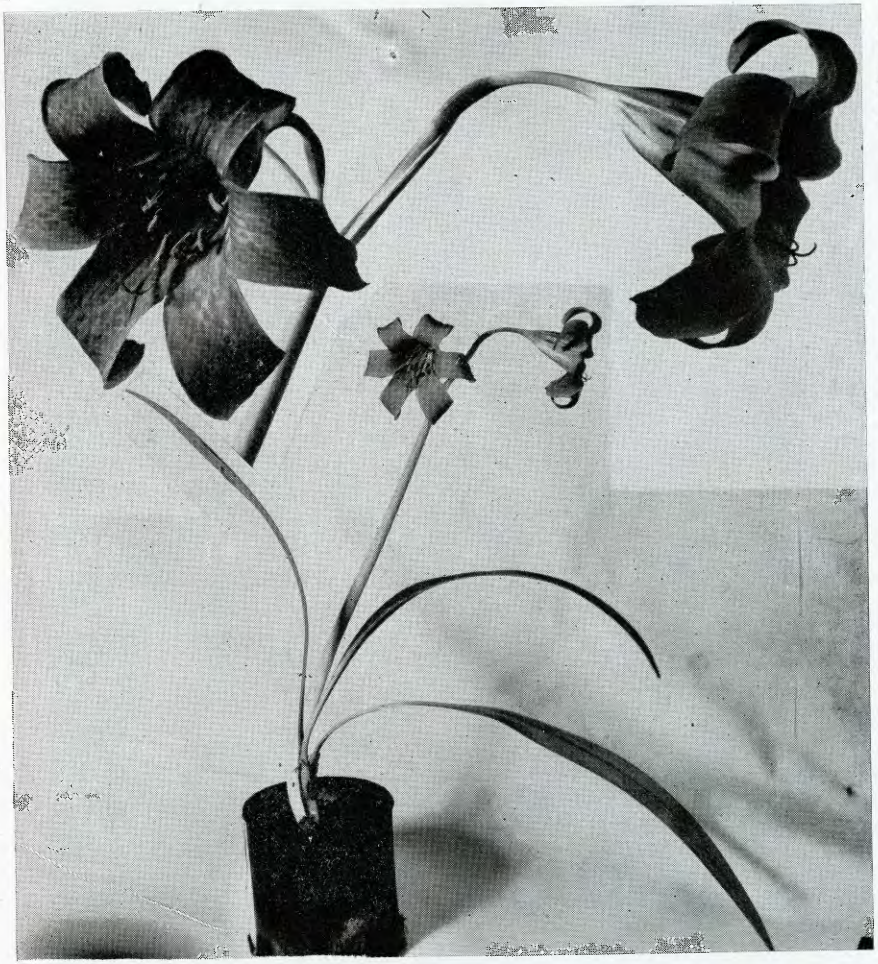
(2) Deciduous *(A. campanulatus, A. longispathus, A. inapertus, A. pendulus* and some others fall under this heading.)

(1) *Agapanthus africanus.* This is known throughout the world. It is interesting to know that bulbs of it were exported from the Cape Peninsula in the early 17th century for cultivation in Europe and from there they were re-exported to other parts of the world and even back to South Africa. To-day one sees few gardens without a clump of *Agapanthus* and often they are used along borders with striking effect. With good soil, sufficient nourishment and water, good results are had in a short time without trouble. Each young growing-point usually gives

one flowering stem, with the result that a mass of blue is to be had in the summer months from November to February. The white variety is not so common. By horticultural selections dark strains with a longer flowering period have been segregated.

Fig. 201. *Ammocharis coranica,* growing in marginal Karrooveld near the Orange River, Orange Free State. Photo by L. E. Codd.

(2) The deciduous species of *Agapanthus* are found on mountain ranges of the Transvaal and Natal. The conditions are generally very moist, with a dry period during the winter months. The plants occur mostly along streams, among rocks and in tall grass. They have smaller flowers than *Agapanthus africanus,* but the inflorescences are usually taller and the colour of the flowers is often darker, up to a very dark purple. All decidious *Agapanthus* thrive in a good well-manured soil, with sufficient water during the growing season and a rest during winter.



Cyrtanthus sanguineus as grown by A. H. Crundall, Umlaas Falls.

Photo by H. King.

Plate 323

Crinum crispum in its native habitat on Thornveld on black clay soil, beside Pienaars River, District Pretoria. Photo by Dr. L. E. Codd.
Plate 324

BRUNSVIGIA

This genus has so far not been cultivated to any great extent in South Africa. The reason is not yet clear. Although some species of *Brunsvigia* occur in rather dry areas, it seems that they generally require a fair amount of rain before flowering. They grow under varying habitat conditions. Some grow in the open, others are wedged between rocks, while yet others grow on mountain slopes in almost inaccessible places, where they are largely sheltered from the direct rays of the sun. Those growing on moist mountain slopes grow in a firm but well drained mixture of fibrous grass roots, soil and leaf mould. Others grow in hard clay or stoney soil. Possibly conditions of cultivation will have to be varied according to the origin of the particular species. As a preliminary trial, however, species of *Brunsvigia* at this Division are being grown in a mixture of four parts garden loam, one part coarse sand, one part peat and one part compost. They are doing well so far, but it is somewhat too soon to say what this mixture is the best one for all species.

CRYTANTHUS

The genus *Cyrtanthus* is a large one and it has been found that *Cyrtanthus mackennii* (Ifafa Lily) and its varieties are by far the easiest to cultivate. They flower here in late winter or early spring and with a little attention give very pleasing results. They grow best under partial shade and flower freely under these conditions. Most *Cyrtanthus* can be propagated from seed, but *C. mackennii* can best be increased by division, as the bulbs multiply considerably. Too frequent transplanting of *Cyrtanthus,* however, does them more harm than good and it has been found that they flower more regularly if left undisturbed. It is essential when transplating *Cyrtanthus* that the soil around the bulbs should be thoroughly firmed. This applies rather generally to all *Amaryllidaceae* bulbs. Other *Cyrtanthus* bulbs which have been grown at this Division are *C. contractus* and *C. sanguineus* of which a photograph is included (Plate 323). Generally speaking *Cyrtanthus* requires a moist well-drained sandy loam. The summer flowering species should be planted May to August and the autumn flowering varieties should be planted from January to March in southern hemisphere. The plants should be watered freely during dry summer weather, but it is advisable to withhold water when the bulbs are dormant.

CLIVIA

The genus *Clivia* produces some of the showiest flowers of all and although quite easy to propagate, it is shy to flower if not properly treated. *Clivia miniata* grows well here in a shade house or under trees, but is has been found that much better results may be obtained if plants are kept under glass in a more humid atmosphere. The plants are normally grown pot-bound in 6″—9″ pots in a mixture of sandy loam enriched with well decayed manure. During the growing period plants should be watered freely and an application of liquid manure once per

month will prove beneficial. *Clivia miniata* and its cream form var. *flava* are the most attractive to cultivate. Sometimes one may find clumps of *clivia miniata* growing at private residences in half barrels or in Alibaba jars with some protection from trees or a verandah. It is a wonderful sight to see as many as twenty flower heads together. The plants are so tight together in the barrels or jars that it is impossible to get any out without breaking the container.

The other *Clivia* species such as *C. nobilis, C. gardeni* are interesting botanically but are not to be compared with *C. miniata* and its hybrids as far as their beauty is concerned.

CRINUM

The *Crinum* species grow very easily and practically under any garden conditions, except for *C. campanulatum.* This grows naturally in shallow pans in the Cape, and does well in permanent water under cultivation.

The Crinums are best propagated from seed, which is very fleshy and should be sown shortly after harvesting. They prefer a good sandy loam in a moist position, and in the open as much as possible. The sowing of seed depends on the time they flower, and as they flower mostly during the summer months, from December to February, one may expect to sow seeds during February to March. They germinate quickly and it is important to keep the young seedlings growing as long as possible during autumn and early winter, so that they can form proper bulbs before the resting season.

With some species in their natural conditions the bulbs may be underground up to 18″ to 24″ and if the soil is hard it is quite a tiring job to dig them out. The photograph (Plate 324) shows *Crinum crispum* growing in its natural habitat about 45 miles north of Pretoria in thornveld in clay soil beside the Pienaars River. Plants at present under the name *C. forbesianum* grow near Pretoria in grassveld in sandy soil and flower during February. The leaves lie flat on the ground and when not in flower are quite difficult to find.

HAEMANTHUS

The *Haemanthus* species grow under varying conditions from cool inland mountain slopes to flat dry Karoo and sandy coastal regions, but under cultivation it has been found that they do well in almost any kind of soil provided the plants are in the shade. The soil should preferably be enriched with well decayed manure. The bulbs should not be watered during their dormant season, that is, water should be withheld when the leaves turn yellow until the new ones appear in spring.

There are many different species and most of them are attractive, but the most outstanding are *H. katherinae, H. magnificus, H. nelsoni, H. coccineus, H. hyalocarpus* and *H. puniceus.*

Nerine falcata; bulbs are 6 years old from seeds, and have been flowering for the past 4 years. Original bulbs from Skaapkraal. Photo by R. A. Dyer.

Plate 325

Sprekelia formosissima under cultivation at Pretoria, South Africa. Photo by R. A. Dyer.

Plate 326

NERINE

Very little difficulty has been experienced with the growing of *Nerines* and the attached photograph (Plate 325) of *N. falcata,* six years after having been sown from seed in the open, is a good example. *N. falcata* has reddish flowers which form a large umbel and they commence to flower during January. Bulbs begin to flower 3-4 years from seed.

Nerines require a light sandy soil to which some well decayed manure has been added. They prefer sunny position, but require ample moisture during their growing season. *Nerine* seeds are first sown in beds soon after harvesting, as they practically germinate on the plant. They are left in the seed bed until about November-December, when they are pricked off into another bed, and are then spaced from 3-4 inches apart. In this position they remain for three or four years before being replanted again into their permanent position.

Nerine filifolia and *Nerine angustifolia* are extensively used as cut flowers and it is quite common to see them being sold by street vendors in different parts of the country. *N. flexuosa, N. krigei, N. bowdeni* and *N. laticoma (lucida)* are easy to propagate and offer no difficulties. *Nerine filifolia* may also be propagated by dividing the old clumps which produce quantities of young offsets every year.

TULBAGHIA

T. fragrans and *T. violacea* are the two most commonly cultivated species of this genus, common in this respect, that they are mostly cultivated in Government or Municipal gardens or parks. There are several other species but they are mostly of little value as ornamental plants. *Tulbaghia fragrans* commences to flower during August after the leaves have been completely cut down by frost, and the clumps reach their flowering peak towards the end of September, while they may continue to produce some flowers during summer and in autumn. A small flush of flowers often appears during March-April. *T. violacea* flowers later than *T. fragrans,* i.e. during October, but the garlic smell of this particular species restricts its usefulness.

Tulbaghias seem to appreciate a loamy soil into which a fair amount of well decayed compost or manure has been worked. During their growing period they should be watered freely but may be left completely dry during winter. *Tulbaghia* prefers the open sun to shady positions. They increase rapidly and are best propagated by division of the crowns. They seem also to prefer the open ground rather than the restricted space of pots. There is no particular time that they should be divided, but it is preferable to it after they have flowered in spring, so that strong new roots may form before the next season. A single plant of *T. fragrans* may increase into a clump 12″-18″ across in 3-4 years, which is sufficient evidence of its vigour and hardiness.

An amaryllid of the Tribe *Zephyrantheae*, probably *Habranthus robustus*, cultivated at Pretoria, South Africa. Photo by R. A. Dyer.
Plate 327

VARIOUS AMARYLLIDS

The foregoing paragraphs have dealt with a few South African species of *Amaryllidaceae* successful in cultivation. There are many more, such as those belonging to *Anoiganthus, Pancratium, Buphane, Hessia* and *Gethyllis,* which have been grown, but which for various reasons have not persisted. There is not always an early opportunity for reintroducing them for further trial. In many cases one can only find bulbs when in flower (which is a bad time for transplanting) for example *Pancratium chapmannii,* which grows under very sandy conditions on the edge of the Kalahari desert.

INTRODUCED AMARYLLIDS

Some introduced *Amaryllidaceae* do well in the Transvaal and the accompanying photographs (Plates 326 & 327) of *Sprekelia formossima* and an amaryllid of the Tribe *Zephyrantheae,* grown in the open, are a fair indication that these bulbs have quite adapted themselves to our conditions.

In conclusion, I would like to mention that comparatively few of the South African bulbs are grown on a commercial basis. Their cultivation is mainly in Municipal and Government controlled gardens where they are propagated on a small scale for ornamental or scientific purposes. Where they are offered for sale in commerce it is sometimes doubtful whether the bulbs have been grown from seed or whether they have been robbed from the veld.

Experience indicates that the majority will germinate and flourish from seed and it seems that a demand for plants could be stimulated and that there is a good commercial field awaiting development.

SOUTH AFRICAN AMARYLLIDS AS HOUSE PLANTS

Sarah V. Coombs, *New York*

This article is written with just one object, the hope that it may induce someone who loves beautiful flowers and is willing to work for that beauty, to try some of the South African Amaryllids. They are a gorgeous group, many brilliant in color, some heavy with perfume, some interesting in form and all with the power to give pride to the people who can grow them. Many of them are not easy to grow or rather, they need a rather simple but definite form of cultivation. Many have had almost no word of their culture to pass on, yet it is always a great day when a lovely *Crinum* blooms for us, when the gold-dust strewn *Nerine* sends up its scarlet-tinted flowers, when the *Cyrtanthus* expresses its appreciation of our care, when the odd *Haemanthus* puts up its startling brush, looking, when one comes on it suddenly in its native land, like a snake's head lifted in surprise.

The marvellous hybrids, raised or imported for us by our firms with a vision, show what we may hope for. Should we not be selling that second loaf (they sometimes cost a good many loaves) and going without that mundane luxury we had meant to buy, to possess one of them. Their very names sound exciting: *Brunsdonna,* a hybrid between *Brunsvigia Josephinae* and *B. rosea* (Syn—*Amaryllis belladonna* Ait., non Linn., or *Callicore rosea), Crinodonna Corsii* (Syn.—*Amarcrinum Howardi),* the Fire Lily, the Scarborough Lily, the Kei Lily, the Candelabra Flower, *etc.* Some of the hybrids have been crosses back and forth and are to be had in this country.

Some obligingly grow easily. Some are apparently cranky. They come to us with the one label,—"From South Africa." Yet should we expect small alpines from Alaska to like the same conditions of soil and heat as the Bluebonnets of Texas or the cacti of the high desert tablelands. We must learn from anyone who has been successful with these treasures. Beyond that we must learn where they grow at home. Some come from the temperate Cape Province, where the rains come in their winter, and are followed by the dry hot summer. Some come from Natal Province, far up the eastern coast, where a tropical arm seems to come down from the Equator, so that many of the flowers can stand much heat. In that section and in the Transvaal, the winters are dry and the heat grows greater in the early summer, till it breaks into the heavy rains. No, it isn't always easy to grow them but is that any reason for not trying some of them? We must learn all we can about them and then go ahead.

To spread out all their faults at once, some of them have a slowness in blooming. Dr. R. A. Dyer of Pretoria, Botanist of the Division of Plant Industry of the Department of Agriculture and Forestry, Union of South Africa, says in Herbertia, Vol. 3, (1936): "Most species of *Crinum* share the horticultural disability of a protracted juvenility," not a very cheerful outlook, yet he says also in the same article: "South Africa has been endowed by nature with a very rich flora in which *Amaryllidaceae* occupy an important position. Many of them were introduced to European gardens during the 17th and 18th Centuries. Some belonging to the genera *Nerine, Haemanthus, Cyrtanthus,* etc., have remained favorites ever since. Enthusiasm for their cultivation locally increases annually."

There are records for faithfullness in blooming hard to beat. This writer, for example, was given well over thirty years ago, a large bulb, called in Vermont, where it had its abode, the "Mexican Lily." It soon proved to be, not a lilium nor from Mexico, and when it bloomed, was named at my request, by the New York Botanical Garden, *Crinum Moorei,* from South Africa. This particular one is white with a tinge of pink. After its prompt blooming it produced several children, one of which, with its parent, has bloomed every year since, without a *single* omission for over thirty years. That is a record of faithfulness. The two have also provided bulbs for many friends, whose bulbs have likewise bloomed steadily.

The following is a matter of note. Bulbs of this species bloom at almost any time. In Vermont they spend the winter in their tubs in the cellar and bloom on the veranda in summer. The bulbs I mention above, bloomed in a small coolish greenhouse in late January or early February. In a heated sunroom they bloom in late February and March and in an unheated enclosed sleeping-porch, they come on a month later.

The above is like a text to me. Though I may tell of bulbs with too early bloom or too late bloom to be really house plants, by treating them in different temperatures, they or their hybrids, will many of them adapt themselves to current conditions. In a June number of a well-known flower magazine the writer tells of the blooming time of *Gloriosa Rothschildiana (Liliaceae)*. He says: "Apparently it can be brought into flower at almost any time of the year." He has seen it in an orchid house on Christmas Day, in a conservatory flower-show in mid-April and in June blooming in a big glass house. I know they bloom out-of-doors in the New York Botanical Garden in summer.

The seasons, of course, in South Africa are the opposite of ours. Many of the bulbs bloom outdoors here in their fall and winter months. We cannot just say that we can duplicate the conditions of heat and soil. It is not quite as easy as that with differences in sunlight, yet constant experiments will bring us great knowledge of the cultivation of these splendid plants.

South African Amaryllis do not require a very rich soil. They enjoy extra fertilizer and doses of liquid manure and, of course, exhibition types need extra care but they will do pretty well even in an ordinary soil. Two things they must have,—all the sunlight you can give them (with some exceptions), and a time of resting. Even where the bulbs keep their leaves, growth is checked for a time. Bulbs which lose their leaves after blooming by drying off may be laid on their sides in their pots under a bush in summer and forgotten. If in a green-house, a covering of salt hay over the pot or laying the pots on their sides will bring them through the hot temperature.

It has been this writer's experience that a small amount of water is better for them at such a time than "bone-dryness." Even in South Africa's summer, there is an occasional storm. While they live through complete dryness, they do better if it is not quite complete. There are two opinions about this.

Cyrtanthus will like more water in growing than most of the bulbs. They grow in moist places, near streams and in high elevations, where they have cool, damp night air.

Seeds need a large proportion of sand in their soil, probably two thirds at the start. Drainage must be perfect. Later, a good garden soil will be right but always with the good drainage. It is possible to overdo the sunlight with young plants. They must be watched. Once well-grown, with care in drainage, much water when blooming and withholding it gradually as they stop growing, they will do well. When they reach mature growth, they will stand a good deal of indifferent treat-

ment without resenting it, though thankful for extra kindness. An amiable lot, really, when a few necessities are looked after.

Do not repot till absolutely necessary. They like to be crowded. The top soil may be dug out of the pot and renewed. It is better than constant repotting.

This story will start off with *Cyrtanthus*. They are as scarce and hard to find in the United States as any of the *Amaryllidaceae* but they are such charming flowers and so adapted to what we would like, that they deserve a nearer acquaintance. They may be our next favorites. Mrs. J. Norman Henry has raised them from seed with great success. In a greenhouse, to be sure, but a cool place, probably, for most South Africans cannot stand intense heat. People fail with freesias, if they do not keep them cool. I would guess the same to be true of *Cyranthus*. They have a wide range, along the southeast coast and all the eastern part of the country up to Natal, so some may be more tolerant of heat.

An interesting project was told of in HERBERTIA by R. G. Huey, Superintendent of the Paintsville, Kentucky, Public Schools. There they became interested in Amaryllids and are hard at work hybridizing and cultivating them under supervision. What a fine thing to do!

Ryk Tulbagh was Governor of the Cape from 1751-1771 and during that time he corresponded with the great Linnaeus, who closes a letter, quoted by my friend Frances M. Leighton in Vol. 6, page 16, from Linnaeus to Tulbagh: "May you fully realize" Linnaeus says: "your own fortunate lot, not only in being permitted by the Supreme Disposer of events to inhabit but also to enjoy the sovereign control of that paradise upon earth, the Cape of Good Hope, which the Beneficent Creator has enriched with his choicest wonders. Certainly, if I were at liberty to change my fortune for that of Alexander the Great or of Solomon, Croesus, or Tulbagh, I should without hesitation prefer the latter." A noble wish!

1. CYRTANTHUS

This flower is perhaps unfamiliar to many. It is a group which has great possibilities from the standpoint of pot culture. When we think how short a time it is since freesias of the irids were new and rare and how the hybrids grow better each year; when we see the increasing liking for the "pink red hot poker" of the nearly fool-proof *Veltheimia* of the Lily Family, we can look ahead to see *Cyrtanthus* in all our window gardens.

Dr. Traub, in the preface to 1938 Herbertia, Vol. 5, says: "other plant subjects that are coming into their own are *Cyrtanthus* . . . . . *Cyrtanthus* appear to be excellent for forcing and some of the species at least are of the earliest culture. As pot plants they are unexcelled."

There is not a wide variety of these bulbs in the United States but seeds may be found and some bulbs. Anyone willing to write to South Africa will find many lovely species. The experimental-minded person has a great opportunity.

Dr. Dyer writes with interest of the Cyranthus and its history in botanical literature. The bulbs have been popular in England for a long time, appearing in color over and over in the BOTANICAL MAGAZINE, and others of the old botanical works. The bulbs were extremely popular for a long time, but later did not keep up their promise. This matter may perhaps be explained or suggested, as it affected many of the other South Africans. The old greenhouses in England were heated by old-fashioned kilns. The water supply was not so abundant. The South Africans loved the cool air of these greenhouses which more nearly approached the temperature of their home, especially the cool nights. When more modern greenhouses with warmer air became popular, with watering more copious, they left their abodes and their places were taken by the orchids and other plants liking the warmer temperature. This is a suggested explanation, at least. Now that we have many cool greenhouses and cool, but not too cool sunrooms many of these lost ones may come back.

Dr. Dyer gives a distribution map of this group. They flourish in a band along the south coast of the Cape Province and extend in a wide section up to the east as far as Natal and somewhat beyond, with one species in Rhodesia. They are found generally he says, along the mountain ranges in moist places, in open grassveld and on cool rock ledges. They are not found in the Great Karoo, nor in dry Namaqualand. They keep generally to the places where there is much rainfall. They seem to be among the plants which grow better after the burning of the grassveld, unfortunately so common in South Africa. FIRE LILY is an appropriate name. They like a light soil with good drainage, a soil, Herbert says, that is more disposed to set firm and not fall to pieces when turned out of the pot.

There is nothing else in this country, I believe, to compare with Dr. Dyer's Revision of the Genus (Vol. 6, page 65). He modestly says it is not complete, but it is far beyond anything we have had before, so far as I know. With this, we can in time add to our *Cyranthus* species and hope to identify them. He describes 44 species and there are some excellent sketches.

Miss Stanford, a grower and lover of the South African flora writes in Herbertia (Vol. 6, page 214—1939): "Flowers of the *Cyranthus* too are always with us. All winter we have *C. Mackenii* making a sheet of creamy white blossom in a swamp. It grows about a foot high and the flowers have a delicious scent. In early spring *C. O'Brieni* follows with brilliant scarlet blooms and at the same season in sandy soil there is the little *C. angustifolius*. In midsummer *C. obliquus* sends up its big umbels of pendulous blooms from some very dry spot on the top of the rock-garden, that is, if someone has remembered to give it water in summer. Best of all is the rare form of *C. sanguineus* known to us as the INANDA LILY, from the name of one of its haunts in Natal. It likes hard gritty soil and water in Summer." The seasons, of course, are the South African ones.

Cyranthus is a lovely flower. It grows from a bulb, with linear or strap-shaped leaves, flowering in a cluster, rarely only one flower. The flower tube is long and narrow, gradually dilated upwards, two or three times as long as the segments, stamens thread-like, sometimes very short, style long thread-like. *Cyranthus* grows easily from seed. Mrs. Norman Henry has had wonderful success growing them in her greenhouse. It must, I believe, have had a cool temperature. Seeds she planted January 25 were up in five days and the bulbs began to bloom April 2 of the following year, 1941. Other seeds planted March 10, 1940, bloomed May 18, 1941, and ones planted March 12, 1940, bloomed May 15, 1941. Among these were hybrids she had grown and they produced some delightful flowers. She speaks of flowers in coral and sea shell colorings, as well as the whites and reds. She writes: "The flowers of the foregoing hybrid *Cyrtanthus* are all attractive. There is not an 'ugly' in the lot."

The species we are most likely to want to try are the large-flowered ones, *C. obliquus* and *C. sanguineus* and the smaller ones, *C. parviflorus, C. collinus, C. O'Brieni* and *C. Mackenii* and *C. lutescens.* There are many others.

C. obliquus grows about 1-2 feet tall. The many-flowered drooping umbels are bright red upwards, yellow at the base, and tipped with green, leaves twisted once or twice. They are found on the Cape Peninsula and up to Natal.

C. sanguineus, the Fire Lily, Ifafa Lily or Kei Lily is bright red with a tube nearly erect or somewhat curved, almost cylinder-shaped in the lower half, one or few to a cluster. From Natal.

C. parviflorus is known as Dobo. Not so tall, flowers red, 1 to 1¼ inches long, 6-12 in a cluster. Wide distribution, as far north as near Barberton in the Transvaal, at over 4000 feet and as far south as Port Elizabeth on the Indian Ocean in the Cape Province.

C. collinus is found on hills in the Cape Province. Flowers bright red, tube curved at base, dilated above. 6-10 in a cluster. Stem about a foot tall.

C. O'Brieni flowers are pale bright scarlet, 7-8 in a cluster, nodding tube, curved perianth, lobes spreading. Natal and eastern part of Cape Province, at about 5000-6000 feet, in crevices of rocks.

The two species, both of which are known as the White Ifafa Lily, are *C. lutescens* and *C. Mackenii. C. lutescens* has yellowish flowers, *C. Mackenii* has white flowers, very sweet-scented. *C. lutescens* considered a color variety of *C. Mackenii.* Both have sub-erect flowers, 4-10 flowered in the umbel; the flowers with a tube dilated from the base. High ground in Natal.

Most of these bloom in English gardens from April to June and would bloom indoors from about February.

2. NERINE

There are few more brilliant flowers than the Nerines. The shape, with its six "petals," the color, pink to coral, to salmon, scarlet, orange, red to crimson with the paler tints and white. Some have a mauve tint, some cerise and in some a well-defended bar runs up each segment. The curious quality which these flowers possess of throwing back the light as if from a myriad of mirrors or seeming at night to be strewn with gold dust, combine to make one of the beauties of the flower world.

The GUERNSEY LILY has been a great favorite with English people for a long time, since the Channel Islands learned that these flowers, which they gained by chance, had a steady sale in the English flower markets. The story, probably true, has been told many times of the ship

Fig. 202. *Nerine* hybrid— Aurora. Shown at N. Y. Hort. Society Exhibition by Mr. James Stuart. Photo by Sarah V. Coombs.

from Japan which, stopping at Cape Town in South Africa for water brought a quantity of the *Nerine* bulbs. The ship was wrecked on the Island of Guernsey and the bulbs were washed ashore and in time surprised the Channel Islanders with the charming flowers, which they were quick to put to use.

The pronunciation of the name is a bother. It seems to be accepted that this beautiful blossom should carry the hideous appellation of nuh-rye'-nee. Working in the Library of the Royal Horticultural Society at Kew for a time, this writer who often discussed this flower, never heard it called anything but nuh-ree'-nee and in South Africa, its home, it is

always called nuh-ree'-nah. Couldn't we have something better than that ugly nuh-rye'-nee?

Nerines are divided according to different classifications, one, whether the blooming in the umbel is centripetal or centrifugal. They are divided also by the fact that they are deciduous or not. According to L. B. Creasy, long in charge of cultivation at Kirstenbosch, the enchanting Botanic Garden, six miles from Cape Town, all broadleaved ones seem to be quite deciduous, while many narrow-leaved species are more or less evergreen. Nerines grow under a wide range of natural conditions and he is opposed to the wholesale drying off of all species generally practiced under pot-culture. The species should be treated, he says, individually. Any which show a tendency to retain their faliage should not be completely dried off.

This should be considered, since pot-culture practice has normally dried all and sundry. They should all have a rest, a checking of growth, by withholding water but this difference in treatment appeals definitely to this writer's experience.

Many of the Nerines bloom early, in October or November, but some species and hybrids bloom at Christmas time or later. Postponed blooming can be obtained increasingly as house-plants by a longer season. The horticultural variety Aurora *(N. Fothergilli* x *N. Bowdenii)* shown here (Figure 202) is an English hybrid, among many others, Dawn, Empire Day, Comet, Nymph, Hera, etc. The Aurora shown (Figure 202) was exhibited by Mr. James Stuart, Superintendent for Miss Marie Constable's estate at Mamaroneck, N. Y. at a meeting of the New York Horticultural Society one year, about December 20. Mr. Stuart gave the blossoms to this writer, who photographed them. There are some beautiful hybrids to be found in this country and in England. Most of the bulbs available in the United States can be had from September and the flowers come on from October to January. Cold storage holds many freesias back and might hold Nerines, and the time of bloom may be lengthened also by the hybrids.

It is to be hoped that no one ever again will grow the *Lycoris radiata* thinking it is a *Nerine.* It is a lovely flower but *not* a *Nerine,* though it was mistakenly called *Nerine sarniensis* for many years.

Most of the Nerines mentioned below may be obtained in this country and some of the hybrids. Interesting breeding work is also being done.

An early one to bloom is *N. masonorum* L. Bolus, blooming probably too early for use as a house plant. It blooms out of doors in July. In its home abode, it is found "between inundated flat slabs of rock" in the Transkei in the eastern part of the country. The leaves are 4 to 5 linear with a longitudinal groove above. It is a delicate little pink flower, like *N. filifolia* but smaller, with stems glandular-downy. It increases rapidly by offsets and seeds. Grows both in sun and shade.

N. sarniensis Herb. The Guernsey Lily. Leaves about 6, bright green, almost erect, after the flowers, strap-shaped, up to one foot long, obtuse, smooth, ½-¾ inches broad; stem slender, somewhat flattened, reddish below, 9-18 inches in height; the umbel many-flowered, flowers

Nerine sarniensis var. *corusca* as grown in South Africa. Photo South Africa Railways and Harbours.

Plate 328

bright scarlet, 1¼-1½ inches long, slightly notched filaments bright red, erect, ½ inch longer than the segments; spathe-valves crimson; fully deciduous. Found on Table Mountain.

This species is not recommended for ordinary planting for, lovely as it is, it does not bloom easily in pots. Its varieties do much better.

Var. *rosea* Herb. Leaves darker green than the type; flowers rose-red.

Var. *corusca* Herb. (Plate 328) Leaves broader than the type, bright-green with distinct cross-bars between the main veins; flowers large, bright orange-scarlet; segments twisted, reflexed; stamens very long; anthers green.

Var. *corusca major.* A fine ornamental plant. Brilliant rose-scarlet. Cool temperature with plenty of air. Blooms before leaves. Flourishes in good loam with a fair admixture of sand.

N. curvifolia Herb. Leaves with a bloom, 6, developed after the flowers, strap-shaped, a foot long, ½-¾ inches broad, obtuse, curved laterally, thicker in texture than N. sarniensis, leaves and flower stalk having a bloom, 1½ foot long; flower cluster 8-12 flowered, flowers erect, bright-scarlet, 1¼-1½ inch long, segments slightly crisped, sickle-shaped; stamen somewhat erect, about as long as the flowers, scarlet with crystal-line-like sheen; style finally about 2 inches long; spathe-valves broadly lanceolate, 1-2 inches in length. Habitat not certainly known. Long in cultivation.

Var. *N. Fothergilli* (Andrews) Baker, more robust in all its parts than the type, leaf broader; flowers more numerous, between crimson and scarlet. A fine cutting flower. Common in English gardens.

Var. *N. Fothergilli major* (Hort) is a form with still larger flowers.

N. flexuosa Herb. Grows in Cape Province at 4000-5000 feet. Leaves 4-6, contemporary with the flowers, bright green, linear-strap-shaped, sometimes rough with pustules, one foot long, stem flexuous, slender, with a bloom, up to 36 inches in length; umbel many-flowered, flowers fairly large, declinate, pale pink to carmine, crisped, over an inch long; stamens and style declinate, shorter than the segments, pale pink; anthers oblong, wine-red; spathe valves lanceolate. This bulb likes a damp soil.

Var. *pulchella* Herb. Leaves with a bloom, firmer in texture than the type. Stem not flexuous, flowers pale pink with a rose-red keel; stamens and style almost white.

N. rosea crispa, a hybrid of *flexuosa* and *undulata.* Sometimes considered hybrid of *N. filifolia.* One of the hardiest, can be kept evergreen or dried off.

N. Manselli, hybrid between *N. flexuosa* and *N. Fothergilli.* Does not open its rose-pink flowers until foliage is fully developed. Flowers on slender, graceful stems. One of the latest to bloom, in December or January.

N. bowdeni W. Watson has large rose-pink flowers with recurved and crinkled segments. It is considered almost hardy as far north as New York City. It is closely related to N. flexuosa and may be a variety of

that species. It has no truly dormant stage, the leaves remaining green until the flowers are well in bloom. More or less evergreen therefore and thought needing a checking of growth with rest, does not have to have the long baking which some of the species need. Very handsome. It has been called by different names but all describe it as a beautiful flower, larger than any others in cultivation. (This may not be true now with all the new hybrids). It has a stalk 18 inches long, the umbel lax, 8-12 flowered, the flowers 4½ inches across, carried horizontally, large, bright rose-pink, segments spreading, waved, reflexed at the tip, with a deep pink keel, stamens and style declinate, rather longer than the segments; filaments pink; anthers greenish-yellow; spathe valves scarious reflexed at the tip, green ageing to pink; leaves strap-shaped, obtuse, bright green, nearly a foot long; stem longer than the leaves, cylindrical, fairly stout. In Cape Peninsula up to 2000 feet. Long in cultivation. Pink Beauty is a good variety.

var. *magnifica,* pinker and larger than *N. Bowdeni,* 18 to 24 inch stem. Very handsome umbel of 8-12, large funnel-shaped, rose-pink flowers in December.

Fenwick's variety seems much more robust than the species itself, with larger flowers, more blooms to the umbel, is a brighter pink in color and carried on a stem up to 3 feet in height. I have not heard of this variety being obtainable except in England.

N. filifolia Baker, 6-10, leaves thread-like, contemporary with the flowers; not evergreen, 6-8 inches long, erect, flower stalk slender, rounded, bright green, glandular-downy, a foot long; flowers 8-12 in umbel, rather small, carmine, spreading, clawed, crisped at margin, about one inch long; stamens declinate, shorter than the flower-segments; anthers reddish; spathe-valves green. Orange Free State and southwest part of the Cape Province and Swaziland. A very satisfactory plant. Grows well in a sandy loam. Easily increased by seeds and offsets.

N. undulata Herb. Leaves contemporary with the flowers, bright green, linear, 4-6, 12-18 inches long, ¼ to ½ inch broad; stem slender, about the same length; flowers much crisped, spreading, pale reddish, 8-12 in umbel; stamens about as long as flower segments and declinate; anthers plum colored; spathe valves narrowly lanceolate. Coast Region, Cape Province and western Orange Free State.

N. humilis Herb. Scape often smaller than other kinds, about one foot in length, nearly round, with a slight bloom, leaves about half-grown when the flowers bloom, linear, strap-shaped, bright green, nearly erect, channelled down the face; flowers 10 to 20 in umbel, spreading, purplish-rose color, variegated with paler tints, narrow, somewhat crisped and notched, segments all point upward; stamens and style declinate, rose-red, about as long as the segments; anthers yellow at first, then purple; spathe-valves lanceolate, greenish-pink. In Cape Peninsula up to 2000 ft. Long in cultivation. A brilliant plant.

N. appendiculata Baker. From Natal and the mountains of the Eastern Districts. It grows in moist positions by streams in full sun. Flourishes sometimes in a swamp. Red segments one inch long, linear,

toothed, crisped in upper half, distinctly keeled; filaments and style rather shorter; spathe-valves small, membranous, red-flushed, flowers 10-15 in umbel; leaves 3, contemporary with flowers, linear, a foot long, deeply channelled down the face; stem stout, rounded, about 2 feet long. Filaments are furnished with a strap-shaped, irregularly cleft appendage at the base.

N. lucida Herb, wide range but found mostly in sections with scant rainfall. Leaves 6-8, bright green, narrow, contemporary with flowers, flabby, one foot or more long; stalk short, stout, flattened; flowers 20-40 in umbel, pink, pale or bright red up to two inches long, line in middle of petals, in and out side, very little crisped, clawed, stamens and style declinate, nearly as long as the flower segments; spathe-valves ovate-lanceolate, short. Seeds mature very quickly and germinate promptly, not so bright or showy as some others but attractive.

Many fine hybrids are being produced both in England and this country and there is great hope for a future with these beautiful bulbs. When their needs are understood and good plans for their cultivation followed, they will become familiar.

The following cultural details are based in part on suggestions obtained from an article by Francis Hanger, Curator at Wisley.

A very important point with the cultivation of nerines is to give them great care after blooming, to build them up for the next year. Before they are ready for their rest, while the leaves are growing, frequent doses of weak liquid manure should be given.

In planting nerines, they should have a soil consisting of 2 parts sandy loam, 1 part well-decayed manure, 1 part leaf mold and 1 part coarse sand. The soil should be mildly acid to neutral, 6.5-7 pH. Sandy soils are likely to be more acid and drainage is better. Mr. Houdyshel considers an alkaline soil most frequent cause of failure. Full sun.

Bulbs, when planted should be covered only three-fifth or even one-half. 5 bulbs to a 6 inch pot, or 3 or 4 big ones to the same size. They like to be crowded, as many South African bulbs do. *N. filifolia,* with its small bulbs, may be planted 12 bulbs to a 6 inch pot.

After blooming, keep up cultivation as above until leaves begin to turn yellow or to show signs of needing rest. The kinds with evergreen foliage do not need as long a rest as the others, which must have several months of baking, with no water or only an occasional dose. Pots may be laid on their sides when tops have dried off or covered with a little salt hay. If a bulb must be transferred to a larger pot, or "potted on," this should be done immediately after flowering as the roots are active and will fill the new soil quickly, so that there is no chance for the soil to become stagnant, a cause of frequent trouble.

Nerines should not be shaken out and repotted completely because of the crowding till they are in danger of bursting the pot, and this change

[SOUTH AFRICAN AMARYLLIDS—COOMBS, continued on page 163.]

DISEASES OF **AMARYLLIDACEAE**, EXCLUDING THOSE **OF ALLIUM** AND **NARCISSUS**

PHILIP BRIERLEY [1]

Following the usage of this journal, Hutchinson's *(5)* and Traub's *(16, 17)* delimitation of the *Amaryllidaceae* is followed, with the omission of the diseases of *Allium* and *Narcissus* which were treated in HERBERTIA for 1944 and 1946, respectively. Published information on diseases of other amaryllidaceous genera is widely scattered and not extensive. Bulletins on diseases of ornamental plants rarely treat any of our present subjects, and the available texts in this field deal with *Amaryllis* Linn. (syn. *Hippeastrum* Herb.), *Galanthus,* and sometimes *Hemerocallis;* German texts discuss *Clivia* also, and one American text includes *Crinum.* Moore *(9)* in an English review entitled DISEASES OF BULBS includes exhaustive surveys of diseases of *Narcissus* and *Galanthus.*

Two diseases, red leaf spot caused by the fungus *Stagonospora curtisii* and mosaic caused by one or more viruses, are reported as affecting many amaryllids. These will be discussed first, and those diseases more restricted in known activity will be treated under the individual genera. It is of interest to note that *Amaryllis* Linn. and *Narcissus* appear to be immune to rootknot nematode *(Heterodera Marioni),* and that *Agapanthus* and *Hemerocallis,* though susceptible, are not commonly attacked *(18).* Furthermore, the reports *(14)* that *Amaryllis* Linn., *Crinum, Narcissus,* and bulb and corm plants in general, appear to be immune to the cotton root rot fungus, should be good news to growers in areas of the Southwest where this disease occurs.

Red Leaf Spot

Red leaf spot, a fungus disease caused by *Stagonospora curtisii,* is reported as affecting *Amaryllis hybrida, A. vittata, Brunsvigia rosea* (Lamarck) Hann. (syn. *Amaryllis belladonna* Ait., non Linn.), *Chlidanthus fragrans, Crinum asiaticum, C. bulbispermum* (Bur.) M. & S. (syn. *C. longifolium* Thunb.), *C. Powellii, Eucharis grandiflora, Galanthus byzantinus, Galanthus* sp., *Hymenocallis calathina, Leucojum vernum, Lycoris squamigera, Narcissus* spp., *Nerine* sp., *Pancratium maritimum, Sprekelia formossima, Sternbergia lutea, Vallota* sp., *Zephyranthes candida,* and *Z. rosea.* The disease is unknown in *Hemerocallis,* and attempts to infect *H. aurantiaca (11)* and *H. fulva (7)* were unsuccessful. Attempts to infect *Agapanthus umbellatus* and *Allium neopolitanum* also failed *(11).* The same disease is known as red blotch and red fire in amaryllis, and also as leaf scorch in narcissus. It is prevalent in both Europe and America, and has been reported in Argentina *(9).* Creager *(2)* made a detailed study of the fungus and the course of its development in nar-

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cissus. Smith *(11)* showed that the same fungus can attack many amaryllids; Laskaris and Dodge *(7)* gave an account of the disease in *Amaryllis* Linn.; and Weiss *(19)* summarized information on red leaf spot and offered suggestions for control.

In *Amaryllis* hybrids red leaf spot appears first as small round red spots on leaves, flower stalks, or petals. Insect or mechanical injuries also produce reddish spots that may be confused with the early stages of the fungus disease. Later the fungus spots enlarge and coalesce, forming elongated cankers with red borders and brown or gray centers. The fruiting stage of the fungus, small dark specks slightly protruding from the tissues, may appear near the centers of large lesions. Spots are most damaging on the flower stalks, where they often cause one-sided growth. The bulb scales about the neck of the bulb are often attacked, but *Stagonospora* is not known to cause decay of the bulb, except in *Galanthus byzantinus,* according to English workers. In *Zephyranthes candida* leaf spots remain small but are surrounded by a bright yellow zone. In narcissus, the lesions are brownish rather than red.

Creager *(2)* furnished good evidence that *Stagonospora* is carried on the bulb of narcissus, and it is generally assumed to be bulb-born in other amaryllids also. It appears to persist in the papery scales about the neck of the bulb where it is often found fruiting. The new leaves and flower stalks become infected as they crowd through this neck area. The primary infections thus established give rise to new crops of spores that can initiate a new series of leaf spots if humid conditions prevail.

Control measures include removal of diseased material, and at least one annual cleaning of the bulbs. A formaldehyde soak (1 part commercial formaldehyde solution to 200 parts water for 2 hours) for dormant bulbs has proved effective in eliminating the bulb-borne phase of the disease from narcissus *(2)* and is safe for *Amaryllis* Linn. *(19)*. Field plantings of *Crinum* and of narcissus, especially Paperwhite and Soleil d'Or, are commonly sources of the red leaf spot fungus and therefore undesirable neighbors for other susceptible amaryllids. Spraying with Bordeaux mixture plus a sticker is often recommended, but the value of this measure has not been demonstrated. In greenhouse culture, much can be accomplished by keeping the foliage dry and by proper spacing.

Mosaic and Other Virus Diseases

Virus diseases of the mosaic type have been noted in many amaryllids; but if we exclude *Narcissus* and *Allium,* we find that very little is known about these diseases. Mosaic diseases of *Amaryllis* hybrids, *Amaryllis xJohnsonii* (syn.—*Hippeastrum xJohnsonii), Amaryllis belladonna* Linn. (syn. *Hippeastrum equestre* Herb.), *Eucharis grandiflora* (syn. *E. amazonica),* and *Nerine sarniensis* have been known for 20 years or more, and in more recent years Hannibal *(3)* has observed mosaic symptoms in species and hybrids of *Amaryllis, Crinum, Cyrtanthus, Eucharis, Hymenocallis, Phaedranassa,* and *Urceolina* in California. Cooley *(1)* has reported a disease, possibly of virus origin, in *Hemerocallis* in Maryland and a virus disease of daylily in California is also on record *(20)*. Such

diseases of one or more amaryllids are known in Europe, Hawaii, Bermuda, Puerto Rico, and Japan, as well as in the continental United States.

Mosaic diseases are recognizable by irregularly distributed light and darker green areas in the leaves. In *Amaryllis* hybrids the pattern is a coarse one, with large patches of yellowish-green appearing at random over the leaf surface. The yellowish areas have irregular margins, and shade into the normal green areas without a well-defined line of demarcation. There is little distortion of the leaf in *Amaryllis,* and affected plants are not conspicuously reduced in vigor. In *Eucharis grandiflora,* which is commonly affected, there is some waving of the leaf margins as well as light and dark green mottling. Symptoms in the other plants reported subject to mosaic are not described in detail. It is to be expected that some of them may show much less prominent and finer grained mottling.

The agents of transmission of the virus diseases of narcissus and those affecting onions are now well known. The mosaic and the white streak diseases of narcissus and the onion yellow dwarf disease are carried by certain aphids (plant lice) and are also experimentally transmissible by simple mechanical methods. In contrast, none of the mosaic diseases of other amaryllids listed above has been shown to be transmissible by natural agents or by experimental techniques. In fact, the evidence that these are virus diseases consists chiefly in the virus-like patterns expressed, in the persistence of these patterns in vegetative divisions of affected plants, and in the occurrence of characteristic foreign bodies within some of the cells of leaves that show mosaic mottling. These "inclusion bodies," or "X-bodies," or "viroplasts," are associated with virus diseases of the mosaic type in many plants, such as sugarcane, wheat, tobacco, and *Dahlia* as well as in *Amaryllis* Linn., and *Eucharis.* These inclusions were studied intensively *(4, 6, 8)* some 20 to 25 years ago when they were considered possible casual agents of the virus diseases they accompany. They are not organisms, as once thought; but they do contain a high concentration of the virus agent, and their presence is so closely correlated with mosaic infection in some plants that they are useful in diagnosis.

There is little evidence that the mosaic disease or diseases affecting the amaryllids here treated are disseminated by natural agents, such as insects. However, natural spread of *Amaryllis* mosaic is reported by Holmes *(4)* in New York and is at least implied in reports from Bermuda *(10)* and from Florida *(15).* All tests for seed carriage have been negative, and it is assumed that the virus is not seed borne. In the absence of seed carriage and of insect spread in greenhouse cultures, the simple procedure of discarding affected plants and propagating from unaffected individuals should effect control. In Florida *(15),* even though natural spread is implied, roguing diseased plants from the field is reported effective.

In addition to the true mosaic diseases, another virus disease known as tomato spotted wilt is reported as affecting *Amaryllis* Linn. in Eng-

land. Leaves of affected plants show numerous yellow or white spots which may be isolated or may have coalesced into pale patches. The leaves finally turn yellow and die *(12)*. The symptoms are similar to those of Amaryllis mosaic but much more severe. Tomato spotted wilt is disseminated by thrips, and is capable of affecting a great many plants, notably tomato, *Tropaeolum*, *Begonia*, and *Zantedeschia*, as well as *Amaryllis* Linn. To avoid this disease in *Amaryllis* Linn., avoid such sources of the disease as those noted above, and control thrips.

Diseases Reported Affecting Individual Genera

Agapanthus.—*Agapanthus* is reported subject to a seedling and leaf blight caused by the fungus *Phytophthora parasitica* in Japan. This soil-borne fungus is world-wide in distribution and affects a very wide range of plants including *Agave* and *Lilium*, but is not reported to attack other amaryllids. Two leaf spots, caused by *Ascochyta hyacinthi* and *Mycosphaerella agapanthi*, are reported as affecting this plant in Italy and Australia and in South Africa, respectively *(13)*.

Amaryllis Linn. (syn. *Hippeastrum* Herb.).—In addition to red leaf spot and mosaic discussed above, the Plant Disease Survey *(20)* has records of a number of other fungus diseases of *Amaryllis* Linn., species and *Amaryllis* hybrids in the United States. A soft rot of the bulbs is caused by *Rhizopus stolonifera*, and in Florida *Sclerotium rolfsii* also produces bulb decay. *Botrytis cinerea* induces gray mold blight and bulb rot occasionally, chiefly in outdoor plantings after chilling. A root rot of seedlings in Florida and Texas is reported as being due to *Pythium debaryanum*. Black mildew *(Asterinella hippeastri)* occurs on *Amaryllis belladonna* Linn. in Puerto Rico. A leaf spot caused by *Cercospora amaryllidi* appears on *Amaryllis* hybrids in Alabama, Louisiana, and Puerto Rico as well as in Europe. In other countries rusts, *Aecidium amaryllidis* in India and *A. hippeastri* in Chile, are recorded, and an anthracnose, *Septogloeum amarylli*, was found attacking amaryllis under glass in Russia. *Puccinia habranthi* is found on *Amaryllis andicola* (syn. *Habranthus andicola)* and *P. reichi* on *Amaryllis chilensis* (syn. *Habranthus chilensis)* in Chile *(13)*.

Brunsvigia.—This genus is subject to many of the diseases affecting *Amaryllis* Linn. Specific diseases recorded *(13)* are a rust, *Aecidium brunsvigiae*, on "*Brunsvigia* sp." in South Africa, and a smut, *Tilletia sydowi*, on "*B. (Ammochloa) subacaulis*" *(sic)* in Algeria.

Clivia.—No American record of disease in *Clivia* has been found, but these plants are attacked by three leaf spot fungi in Europe, *Ascochyta cliviae* in Italy, *Colletotrichum cliviae* in Bohemia, Holland, and France, and *Physalospora himantophylli* in Spain *(13)*. In addition to these parasitic diseases, two disorders of non-parasitic origin are described from Denmark as "marginal spot" and "cork disease." The former is first characterized by tiny yellowish spots along the leaf margins, and later by bleaching, browning, and shriveling of patches of leaf tissue. The cork disease is marked by the development of many small slightly raised areas in the leaves.

Cooperia.—This is subject to rust, *Puccinia cooperiae,* in Texas *(20).*

Crinum.—*Crinum* diseases in the United States include, in addition to red leaf spot and mosaic, another leaf spot caused by *Cercospora pancratii* in Alabama, Florida, Mississippi, and Puerto Rico *(20).* Elsewhere two rusts, *Aecidium crini* and *A. mangaranga,* occur in South Africa, and three more leaf spots are known, *Gloeosporium crini* and *Septoria crini* in Italy, and *Mycosphaerella crini* in the Caucasus.

Eucharis.—*Eucharis* is affected with gray mold blight, *Botrytis cinerea,* in Florida *(20),* and by two rusts, *Aecidium deliculatum* in Trinidad and *Uredo eucharidis* in Ecuador and Peru *(13).*

Galanthus.—Botrytis blight, caused by *Botrytis galanthina,* is an important disease of snowdrop in Austria, England, Denmark, Holland, Germany, and Sweden *(9),* but has been noted in the United States only in the sclerotial stage on imported bulbs *(20).* Plants are often attacked as they emerge from the soil in spring. At this time some are seen to be covered with a felt of gray mold, and the whole plant including the bulb is soon completely rotted. The sclerotia, a resting stage of the fungus, are round or irregular in shape, black, and about the size of a pinhead. These sclerotia often develop on the papery outer scales of the bulbs, and are thus carried in commerce. When slightly affected bulbs are planted they often fail to emerge, and rot completely. The fungus seems to attack snowdrops through the soil rather than by air-borne spores, and persists for at least a year, and perhaps much longer, in soil that has borne a diseased planting. *Botrytis galanthina* is considered distinct from the *Botrytis* spp. attacking other flower bulbs, and does not attack other plants as far as known, but the allied *B. narcissicola* from narcissus has been induced to attack *Galanthus* experimentally. *Galanthus nivalis, G. graecus, G. Elwesii,* and *G. Fosteri* are susceptible to Botrytis blight, while *G. nivalis-charlochii, G. nivalis-redoutei, G. cilicicus,* and *G. plicatus* show evidence of resistance *(9).* For control, avoid planting diseased bulbs, and avoid soil known to harbor the disease. Bulbs with sclerotia in the outer papery scales only may be cleaned by removing these scales. If Botrytis blight is recognized in a planting of snowdrops the affected plants should be removed with some of the surrounding soil and burned *(9).*

A *Sclerotium* sp. occurs on the outer papery scales of snowdrop bulbs in Europe, resembling the sclerotial stage of Botrytis except that the black bodies are much smaller *(9, 20).*

A smut, *Urocystis Galanthi,* is recorded on Snowdrop in Germany, and two rusts, *Melampsora galanthi-fragilis* and *Puccinia galanthi* are known in Europe.

Haemanthus.—This is subject to a leaf spot caused by *Cercospora haemanthi* in South Africa *(13).*

Hemerocallis.—In addition to root-knot and the possible virus disease mentioned above, there are records *(20)* of fungus leafspots on daylilies caused by *Botrytis* sp. in Maryland, by *Cercospora hemerocallidis* in Illinois, and by *Heterosporium gracile* in New Jersey. A root rot caused by *Sclerotium* sp. is reported from Indiana. The *Cercospora* leafspot is

also recorded in Bermuda. Elsewhere *(13)* a rust, *Puccinia hemerocallidis,* is known in Siberia and Japan, a leaf spot due to *Colletotrichum liliacearum* in Italy, and one due to *Mycosphaerella hemerocallidis* in Yugoslavia.

Hymenocallis.—This may be attacked by *Cercospora pancratii,* causing a leaf spot in Florida, Louisiana, Texas, and Puerto Rico, and in Puerto Rico by *Mycosphaerella aggregata.* Large dark brown leaf spots in Java are caused by *Tubercinia javanica (13).*

Ixiolirion.—This is subject to two rust diseases due to *Aecidium ixiolirii* and *A. tartaricum* in Asia *(13).*

Leucojum.—A *Botrytis* is recorded on bulb scales in Oregon. A rust, *Puccinia schmidtiana,* is found on snowflake in Austria, Germany, and Italy; also leaf spots due to *Ramularia ucrainica* and to *Septoria malisorica* in Southern Europe *(13).*

Lycoris.—This has been reported to be attacked by the bulb nematode *Ditylenchus dipsaci,* and by two other species of nematodes, *Aphelenchoides fragariae* and *Hoplolaimus* sp., in North Carolina and Virginia *(20).*

Pancratium.—A rust, *Aecidium amaryllidis,* is reported from India *(13).*

Zephyranthes.—A rust, *Puccinia cooperiae,* is found in Alabama, Florida, and North Carolina; a leaf spot due to *Colletotrichum liliacearum* in North Carolina; and a scale speck due to *Sclerotium* sp. in Oregon *(20).* Elsewhere the rust *Aecidium zephyranthis* is found in Mexico, and a leaf spot due to *Septoria psittacina* in Italy *(13).*

Only fragmentary information is available on the diseases mentioned, with the exception of the red leaf spot and mosaic diseases and the Botrytis blight of *Galanthus.* Indeed, all we know of many of these troubles is that they were found on a certain plant in a certain place at a certain time. This furnishes very little basis for evaluating their importance. We might assume that a disease recorded only once in a distant land is of no concern to domestic cultures, but such an assumption is not necessarily sound. Studies on the nature of these diseases and on the conditions favoring their development would be reassuring, for to be forewarned is to be forearmed.

Literature Cited

1. Cooley, J. S. A nonparasitic leaf spot of the daylily. Herbertia 12: 145-147. 1945.
2. Craeger, D. B. Leaf scorch of narcissus. Phytopathology 23: 770-786. 1933.
3. Hannibal, L. S. Mosaic virus in the amaryllids. Herbertia 9: 149-150. 1942.
4. Holmes, F. O. Cytological study of the intracellular body characteristic of *Hippeastrum* mosaic. Bot. Gaz. 86: 50-58. 1928.
5. Hutchinson, J. Families of flowering plants. Vol. 2. Monocotyledons. London. 1934.

6. Kunkel, L. O. Further studies on the intracellular bodies associated with certain mosaic diseases. Bul. Exp. Sta. Hawaiian Sugar Planters Assoc., Bot. Ser. 3 (2) : 108-114. 1924.
7. Laskaris, T., and Dodge, B. O. Red-blotch of *Hippeastrum*. Bull. Torrey Bot. Club 68 : 463-466. 1941.
8. McKinney, H. H., Eckerson, S. H., and Webb, R. W. Intracellular bodies associated with a "mosaic" of *Hippeastrum johnsonii*. Phytopathology 13 : 41-42. 1923.
9. Moore, W. C. Diseases of bulbs. Ministry Agric. & Fisheries. London. Bul. 117. 176 pp. 1939.
10. Ogilvie, L. Report of the Plant Pathologist for the year 1927. Rep. Dept. Agr. Bermuda 1927, pp. 26-37. 1928.
11. Smith, C. O. Inoculations of *Stagonospora curtisii* on the Amaryllidaceae in California. Phytopathology 25 : 262-267. 1935.
12. Smith, K. M. Some diseases of ornamental plants caused by the virus of tomato spotted wilt. Jour. Roy. Hort. Soc. 60 : 304-310. 1935.
13. Stevenson, John A. Foreign plant diseases. A manual of economic plant diseases which are new to or not widely distributed in the United States. U. S. D. A. Federal Hort. Board. 198 pp., Washington. Govt. Print. Office. 1926.
14. Streets, R. B. Phymatotrichum (cotton or Texas) root rot in Arizona. Ariz. Agr. Exp. Sta. Tech. Bul. 71. 1937.
15. Townsend, G. R. Miscellaneous studies. *Amaryllis* mosaic. *In* Rep. Florida Agr. Exp. Sta. 1934-35, pp. 129-130.
16. Traub, Hamilton P. The Tribes of the *Amaryllidaceae,* Herbertia, 5 : 110—113. 1938.
17. ....., and H. L. Moldenke, *Amaryllidaceae:* Tribe *Amarylleae*. Stanford, Calif. 1949.
18. Tyler, Jocelyn. Plants reported resistant or tolerant to root knot nematode infection. U. S. Dept. Agr. Misc. Pub. 406. 91 pp. 1941.
19. Weiss, F. The red leaf spot or "rust" of *Amaryllis*. Yearbook American Amaryllis Soc. 1 : 92-94. 1934.
20. ..... Check list revision. Plant Disease Reporter 31 : 46-47. 1947 *(Hemerocallis)*. 31 : 459-465. 1947 *(Amaryllis, Cooperia, Crinum, Eucharis, Galanthus, Hymenocallis, Leucojum, Lycoris, Nerine, Sternbergia, Vallota, Zephyranthes)*.

SURVIVAL OF AMARYLLIDS, 1941—1945

RUSSELL S. WOLFE, *South Carolina*

[Russell S. Wolfe served as an officer in the U. S. Armed Forces during World War II, and we are pleased to have him back again in the ranks of amaryllid enthusiasts.—Ed.]

In response to Doctor Traub's request to write a few notes about results noted in my bulbs due to their neglect during the years 1941-45, it seems necessary or proper to make a few explanatory remarks.

Although my absence from home began about mid-February 1941, the effect of the loss of help (labor) and my presence or advice was not so noticeable during that season.

Beginning 1942, my assignment caused me to be too far away to be able to keep in touch with affairs at home. My labor gradually began getting away, going into the service or into some war-work until there were finally less than ten per cent of my usual crews remaining. There was no one with the "know-how" or managerial ability to carry on. Finally, my letter to the colored foreman instructed him to just take care of whatever fields he could with the available labor. The situation upon my return is briefly expressed in the following notes.

Allium spaerocephalon—bulbs had multiplied and were very small; and, the resulting bloom heads were also small.

Amaryllis—in the fields were generally in fair condition. It had become my custom to group all *Amaryllis* bulbs resulting from any certain cross in the same bed or row. Therefore it was readily noticed that some groups were evidently hardier than others. For instance, some groups had many vacant spaces in the bed where the bulbs had died; while other groups had multiplied into large clumps that had become almost too crowded for proper blooming. Some of the bulbs had grown too high out of the ground, causing them to be susceptible to freezing.

Chlidanthus fragrans—had developed into large tight clumps of very small bulbs, too small to bloom.

Cooperia pedunculata—were barely existing.

Gladiolus—about five acres of these bulbs were a complete loss.

Gloriosa virescens—came up and bloomed serenely in spite of all the grass and weeds.

Amaryllis advena—multiplied into large clumps right along with the thick Bermuda grass; but, Habranthus brachyandrus were hard to find.

Habranthus brachyandrus—were hard to find.

Hedychium coronarium—had deteriorated; but, were still living and blooming.

Hemerocallis (in about thirty varieties and many seedlings)—suffered very little if any ill effects, and, had developed into large strong clumps.

Hyacinth, Roman (blue)—had developed into large clumps of small bulbs that bloomed sparsely.

Iris siberica—in high spots in the open fields the plants had disappeared; but, in the lower places, had multiplied into thick clumps of many divisions that bloomed nicely.

Lilium Henryi—were rather deteriorated and many bulbs missing; *Lilium* (Regal)—had practically disappeared; *Lilium tigrinum*—were in fair condition.

Lycoris aurea—were living, but in a rather deteriorated condition; *Lycoris radiata, L. radiata alba* and *L. squamigera* seemed normal, in fact, had developed into large clumps that bloomed profusely.

Milla biflora (Estrellita)—only a few small bulbs survived, striving gamely to bloom, a few succeeding.

Narcissus—in different types showed varied results. The large trumpet types suffered more. Other types, such as the Soleil d'Or, Laurens Koster, Orange Cup, Sir Watkins, and Queen Anne multiplied and grew into large clumps of small bulbs, while the Paperwhites (about four acres) were practically lost. Field mice in burrows are given credit for eating many of the *Narcissus* bulbs in the grassy field.

Scilla hispanica—had disappeared, except in shady spots where large clumps of these bulbs bloomed profusely. It is thought that field mice ate many of these bulbs.

Sternbergia lutea—were alive, but rather deteriorated. Only a few blooms with short stems.

Triteleia (Milla uniflora violacea)—seemed to suffer no ill effects, developed into thick clumps that bloomed nicely.

Zephyranthes (white), *Z. atamsco,* and *Z. Ajax*—had developed into nice clumps of small bulbs that bloomed normally; *Zephyranthes carinata*—had only a few bulbs remaining; *Zephyranthes citrina*—were in fair condition; *Zephyranthes lutea*—were almost extinct, except in fairly shady spots; *Zephyranthes rosea*—had completely disappeared.

Upon my return, it was soon learned that very little labor was available. After making a survey of the plantings, it was decided to heavily fertilize and properly water all bulbs, whether or not possible to clear grass and weeds in advance. And later, to offset lack of sufficient labor, labor saving machines and tools were substituted until all planting could be cleaned up. Then, during the proper seasons, overcrowded bulbs were dug, divided and replanted into fresh fields.

It seemed that the above briefly outlined plan (especially the heavy fertilization, whether or not previously cleaned of grass and weeds) was wise, as all the above mentioned bulbs quickly responded favorably, and, at present seem to be in good normal condition.

These brief notes would indicate that many bulbs stand more neglect than others, and, are tougher than most any other types of plants; because, practically all of my plantings of Hardy Asters, Shasta Daisies, Hartje and Elder Daisies, Roses, Aquilegia, Phlox and other perennials were a complete loss.

BLOOMING HABIT OF **LYCORIS RADIATA**

W. R. Ballard, *Maryland*

Some years ago someone gave me a few bulbs of what were known in the southland as "Coral lilies." They looked much like *Narcissus* bulbs and so were planted as recommended for this common bulb. I was interested to discover that the foliage started to grow in the fall and lived over winter, finally dying down about the last of June. Later in the summer I was surprised to find naked flower spikes pushing up rapidly. After they came into bloom, I wanted to know what they were. It did not take long to determine that they were the amaryllid now known as *Lycoris radiata.*

I had planted them in a sandy loam soil of only moderate fertility and they have continued to flourish for several years blooming every year in August or early September, their appearance varying somewhat with favorable moisture conditions.

Four or five years ago I decided to give some of the bulbs better growing conditions. I therefore prepared a special bed for them, incorporating with the soil a generous supply of leaf mould. Under these conditions the bulbs have grown satisfactorily but to this day they have never produced a single bloom. A garden friend of mine has had a similar experience and he has threatened to dig all his bulbs up and throw them away.

Meanwhile the original bulbs left undisturbed continued to bloom as regularly as the season come around. These are grawing in ordinary sandy loam in full sun. The moral seems to be: *"Dont treat these bulbs too kindly!"*

LEUCOJUM AUTUMNALE AS A POT PLANT

Hamilton P. Traub

In a recent issue of Herbertia [14(1947): 100. 1948] reference was made to the excellent qualities of *Leucojum autumnale* as a pot plant. It was stated that although this species normally blooms only in the fall or early winter in its native habitat, it proved to be practically everblooming when grown as a pot plant indoors. It has since been determined that it is everblooming only if the temperature is kept at 75° to 85° F., or somewhat above. If the temperature is kept at 65° to 75° F., or below, the plant remains in the vegetative condition until the advent of the relatively warmer spring weather, after the fall—early winter blooming period. Most amaryllids have distinct blooming periods even under pot culture, and this is an unusual case among this plant family. The illustration (Figure 203) shows an 8-inch pot-ful of *Leucojum autumnale,* which increased to the present number from 8 small bulbs within two years. The photo was taken on May after the bulbs had flowered profusely for months. The bulbs are now so crowded that repotting is necessary, beginning again with 8 bulbs to each pot.

In central and southern California, and possibly farther north, *L. autumnale* should prove to be an excellent rock garden plant. It might also be adapted to Arizona, New Mexico, South and Central Texas, and should be tried out in these states. Apparently it has not been tried out in the southeastern states. Reports from others who have grown this plant would be of interest.

Fig. 203. *Leucojum autumnale* as a practically everblooming pot plant.

AMARYLLIS AMONG THE CLIFF DWELLERS

LEONARD C. SMITH, *Illinois*

Many modern cliff dwellers—those curious beings who, for reasons I can never hope to understand, seem to prefer vertical living—live and die without realizing that the *Amaryllis* offers an excellent opportunity to satisfy that innate longing which every normal person has for something "green and growing." Ivy, *Philodendron,* and *Nephthytis* are quite all right for greenery, but once the city apartment dweller has experienced the drama of a hybrid *Amaryllis* bursting forth into glorious bloom right on his own window sill, he is prone to look with disdain on

any plant less spectacular. The play upon his vanity must not be overlooked; he is the envy of the entire neighborhood. After all, he shares the front entrance to his edifice with from six to sixty other refugees from nature. How can they avoid seeing it when it has been placed so conspicuously? And, if they take no notice, the proud possessors will carry it over to their apartment to gloat.

Now, the only thing wrong in this picture is that more people are not doing it, especially in the crowded sections of large cities. And it is not alone the blooming of *Amaryllis* that is possible on an apartment window sill. Here, in our Chicago cubicle, we bloom them, cross-pollinate them, ripen the seeds, plant the seeds, rear the seedlings, and bring them into bloom, completing the entire life cycle, in the sunshine of a double window in a bedroom.

Almost anyone can secure blooming-size *Amaryllis* bulbs from his seedsman. But even the garden club members seem to believe that the production of viable seeds and the raising of the seedlings require some sort of black art or abracadabra. Attention to a few simple details will disclose that it not only can be done but that a whole new sphere of interest will be revealed.

We try to bring into bloom simultaneously those specimens which would seem to possess good attributes for parenthood of seedlings. Cross-pollination is accompanied by transferring the pollen to the stigma of the seed-bearing parent. Such crosses are usually made on a reciprocal basis. In that maner, both bulbs will probably set seed. After ripening, the seed is planted in moist sphagnum. A small aquarium with a pane of glass covering the top provides the "Wardian case" conditions of humidity and temperature in which the seedlings seem to thrive. They remain in the aquarium, with just an occasional sprinkle of water, until they are ready to be potted in two-inch pots or several in a larger pot. Weak manure water introduced into the sphagnum will stimulate growth before potting.

Most of our seedlings we take with us on an annual trek to our little home in Winter Park, Florida. There they grow into maturity in the garden, but we have carried them through to maturity right on the window sill in Chicago. Some of these days we hope to be emancipated from "cliff dwelling" and be privileged to broaden our fields of operation—and our fields of *Amaryllis*. We are confident, however, that we would not depart widely, except in scale, from the routine that has been established in the production of seedlings.

We would not be so brash as to indicate that what we need in this country to cure our ills is for the President to declare an "*Amaryllis* Week," or for a great campaign to be launched on the theme: "Have you a little *Amaryllis* in your apartment?" But we are convinced that a world of pleasure awaits many thousands of urban dwellers who learn that, through the *Amaryllis*, their six-inch by twenty-six-inch window sill can become a bedroom botanical garden.

NOTES ON HYBRID **AMARYLLIS**

J. G. DuPuis, M.D., *Miami, Florida*

During and since the recent blooming season of the year 1948 (February to May) daily visits have been made through my *Amaryllis* garden and many gorgeous and beautiful patterns in a panorama of colorful blooms have been observed and enjoyed, together with several new individual color patterns which have been marked for future reference and study. One of them is entirely red including the throat of the bloom. Also I have marked one bloom which is entirely red, producing eleven tepalsegs, and another of the same color with sixteen tepalsegs. These individuals have never been observed prior to this year.

Last year, 1947, we had marked three perfectly white *Amaryllis* that were taken up and potted; one has reproduced a beautiful bloom, the other two have not bloomed up to this time and are probably taking a rest period. Besides these individuals which have been marked for identification there have been observed several patterns intermediate between many colors and patterns of colors heretofore unobserved—these have been so marked to study their future behavior.

In my collection, I have an individual "peach orchid" bloom which is identified as No. 11 and is both entertaining and distinctly beautiful. This bulb is smaller than the average bulbs in my collection and is a rare individual which has no tendency to develop and reproduce offsets nor do the seed pods have a tendency to develop or mature seeds. As there are only a small number of these individual bulbs in my collection I resorted to the splitting of 28 bulbs to produce more bulbs of this variety. All of these bulbs produced an average of two bulbs each, however, all the mother bulbs dried up and perished, and the new bulbs that were produced were very small in size and will take form two to three years before they will be large enough to bloom.

With such poor average results by this surgical procedure on this particular individual variety of bulb, I feel that this method has been a failure, as I had 28 blooming size bulbs to start with before this experiment and they usually produced one offset each during the year, therefore, you can readily calculate that this program of reproduction is not encouraging on this particular type of hybrid *Amaryllis*. Perhaps, under other conditions better results might have been obtained.

This past season on my No. 15 bulb, a very robust clone producing a large flower, I tried the experiment of covering the bloom just before it opened, both with wax paper and also cheese cloth on different blooms and letting it remain covered until the bloom had thoroughly wilted and the seed pods formed. In planting of the mature seed, a germination of 25 to 30 percent was the result. Open field and uncovered blooms germinated 75 to 90 percent.

Throughout the past blooming season of 1948 (February to May) it is gratifying to report that the flower markets in this area and their patrons are becoming more conscious of the beauty and value of the

hybrid *Amaryllis* as a cut flower, not only for their colorful blooms but for their lasting qualities, and we sell many thousands of blooms locally to florists and flower markets during the blooming season and at Easter. Due to the many thousands of bulbs in my garden and their varying ages, we are able to supply a few blooms during each month of the year—and in my opinion it is only a matter of a short time before the hybrid *Amaryllis* will be recognized as a cut flower as well as a potted flower.

THE DAYLILY IN THE GARDEN

W. R. Ballard, *Maryland*

It would appear that many of the modern varieties of daylilies have been introduced on the basis of size, shape or color of bloom or because of a favorable season of flowering. Apparently little consideration has been given to the effect which a well developed clump might have in the hardy border.

One reason for this is undoubtedly the desire to propagate the new variety quickly in order to get it into the trade. It takes a little time to develop a well grown clump that would approximate the performance which could be expected of the variety when placed in the flower garden, and many producers are not willing to make careful tests along this line.

It is true that garden effect sometimes depends upon other factors than the qualities inherent in the variety itself. One need mention only the question of a suitable background and contrasting forms of other plants.

However, there are a number of features of a daylily which give it value as a member of the garden family. Good foliage is one of these. Obviously the evergreen type is the one to be preferred. The foliage should present a pleasing appearance not only up to the time of blooming but also after the flowering period is over.

A variety should have good proportion—the relation of the mass of bloom to the mass of foliage, the size of the flower to the stem. If the flower is large, the stem should be sturdy enough to support it properly. In some cases the length of the stem will be entirely out of proportion to the size of the flower.

It is desirable that the plant should have a large number of flowers open at one time to give a mass effect. There should be a comparatively long season of bloom. Stems need to be well branched to display the flowers to advantage. The multiflora types have this characteristic well developed. Sometimes a mass of small flowers are more attractive in the garden than a few large flowers.

Dwarf forms for the front of the border, tall types for the rear and others of medium height all have their place in the hardy border.

The daylily, like many other fine perennials, responds to good culture. When given special treatment, varieties sometimes give such a good account of themselves that visitors often fail to recognize even the common varieties. Varieties are frequently more floriferous under these conditions.

Season of bloom is an important consideration in the selection of varieties for the garden. Care should be given to the placement of daylilies so that those in bloom at any one time are well distributed throughout the border.

Modern varieties which maintain a nice clump are much preferable to some of the older types which spread widely in the garden and interfere with the growth of other plants and at the same time break up the garden picture as designed.

So many suitable varieties are now available for garden use that there is little excuse for not making important use of this flower when any one contemplates establishing a hardy perennial border. It would be very helpful to beginners if a list of the most adaptable varieties for garden use could be published in a future report. A systematic drive should be made to induce a wider use of this most satisfactory plant in developing perennial gardens.

NOTES ON DAYLILIES IN 1947

J. S. Cooley, *Maryland*

The march of the seasons has its interesting as well as its discouraging aspects for the daylily enthusiast. In 1947 the early varieties were very disappointing. They gave very few blossoms and some of those were misshapen. The cold weather in April and May, after the shoot growth had started, probably affected the quantity and quality of the flowers. The temperature was as low as 26° F in May. The bloom scapes of the early variety Elizabeth were frozen to death. Apparently the crowns of some of the early mid-season and mid-season varieties were so injured that blooms were scarce. Such varieties as Queen Mary, Lidice, Golden West, and possibly many more gave very few blooms compared with their usual performance. The bloom scapes were not in evidence when the cold spells occurred, but it seems probable that the freezing weather after the warm weather of March injured the flower bud primordia to the extent that few flowers were produced. Most of the varieties which bore only a few flowers during the normal blooming period, produced an unusually good second crop in August.

More information is needed on the effect of different conditions on transplanting daylilies. We need to know under what conditions transplanting will cause least shock to the plant and what the conditions are which make for optium recovery from transplanting. If we had more information concerning the effects which certain conditions produce, we could more wisely adapt these facts to our local weather and soil conditions. This is particularly true as to the effect of certain conditions subsequent to transplanting. In 1947 we had a chance to make some observations on the effect of the time of transplanting. Those plants that were divided and transplanted in August 1946 did not go through the winter in good condition. Although we expect some of the fleshy storage roots to die after transplanting, a much larger proportion than usual of

these roots died and rotted. The plants were consequently weak and small. When this condition was noted in the spring of 1947, other plants of the same varieties and having similar nutrient conditions but which had not been transplanted in 1946, were dug and the roots examined. They showed good root development and good general vigor. It is probable that unusual autumn and winter weather conditions were responsible for these poor transplanting results. Probably the wet autumn weather prevented soil aeration to an extent that was harmful to the old roots and inhibited new root formation. The subsequent winter cold and wetness probably also had an additional harmful effect on such weakened plants although not affecting the non-transplanted ones. Usually those plants which are transplanted as early as August make a good showing the next year. We have repeatedly advised against late fall transplanting in this locality. Because of the few seasons, such as 1946, when August transplanting gave poor results, spring is probably preferable to mid-summer for transplanting daylilies in this locality. However the gardener has only a brief time in which to get his work done if he attempts spring transplanting. The ideal time for transplanting would probably be a time after the danger of heavy freezing of the ground and consequent cold injury to the crowns of newly transplanted plants is over but before the extensive development of new roots and shoots. Even though one may not be able to divide and transplant at the optimum time in the spring, it seems that under our conditions spring transplanting is probably preferable to mid-summer. This schedule makes certain that the plants will become well established before winter.

A word here about the importance of the light-yellow daylilies in the color scheme of the garden may not be out of place. In the general perennial garden, light yellow complements blue and purple. One can scarcely imagine a more attractive picture than the lemon yellow Flava with light blue iris. Later in the season when the bearded irises are gone but other blue flowers are in bloom one may use the beautiful Patricia or still later he may use Dorothy McDade as a complement for the blues and purples. Light yellow is also pleasing with pink flowers, such as phlox, especially if there is plenty of green foliage or light blue flowers are near the pink and yellow ones. Light yellow is very important for tying the orange colors in with other colors in the garden. Since yellow is analogous to orange it blends that color in with reds or pinks. The use of the light yellows prevents the feeling of rustiness which certain orange tones give with blue. Since the plain light yellows are so beautiful and so important in the color harmony of the garden, they might well receive more attention from the breeders. Gardeners would like to have light yellow daylilies that cover a longer blooming period and have more abundant blooms, that are more resistant to fading by the sun, that have better finish and substance. Most of the light yellows now in cultivation have some objectionable features that might be corrected by breeding. They all appear to have some inheritance making for burning in the hot sun. The light yellows are the main varieties that have a pleasing fragrance. The species *H. citrina* is very fragrant and is also a night bloomer.

Perhaps an hereditary character from *H. citrina* carries the genes responsible for the early opening in the morning and early fading in the evening and the burning in the hot sun which such a variety as Modesty shows. The light yellows that have proved best in our plantings are, in the order of blooming: Flava, Modesty, Pale Moon, Princess, Patricia, and Dorothy McDade. It seems not improbable that before long the season will be covered by yellow *Hemerocallis* which have the exquisite light yellow color of Pale Moon, the finish of Patricia, and the floriferousness of Circe or Mrs. W. H. Wyman.

NOTES ON THE 1948 DAFFODIL SEASON

Grant E. Mitich, *Chairman,*
Narcissus Committee,
Canby, Oregon

The abnormal lateness of our season in Oregon may be indicated by the fact that as I start writing these notes on May 19th, I have before me some fresh blooms picked today. Generally there are few blooms left after the first of May other than perhaps *N. poeticus recurvus.* Of those before me now, one is a small crowned green-eyed leedsii from Cushendall x Cantabile, and another, a pretty small double all white flower from the same cross. Quite a number of seedlings from Addio, a very late 4b, are yet in good condition. In our main field there are still a few blossoms of Frigid open although they have lost their original pristine beauty due to age and the buffeting of wind and rain.

With the ushering in of the new year, the chances of an early season seemed most auspicious as there had been an abundance of moisture and very little frost. A pot of *N. minimus* placed on the north side of the garage with no covering nor protection had buds nearly ready to split their spathes on January 10th. As colder weather was in the offing, this pot was taken indoors and the first flower was open five days later. From that date virtually nothing more opened other than *N. cyclamineus* and *Mite,* a cyclamineus hybrid, also potted and taken inside, until about the middle of March when February Gold, Forerunner, and Malvern Gold started opening. A few days later, Fortune, Whiteley Gem, and other earlies joined the procession but it was not until early in April when a few warm days at Easter brought out quantities of bloom. There were no extremely cold days but much alternate freezing and thawing conspired to hold growth to a minimum.

Young seedlings were damaged somewhat, as due to the mild weather in the early part of the winter, fall sown seed started germinating early and there were some casualties resulting from the heaving action of the frost. Not many of those covered by sash were damaged, but even second year seedlings left unprotected were in some instances broken off. Named varieties and larger seedling bulbs were uninjured except that foliage tips in some instances were softened and made susceptible to scorch.

While the season was late and many early and midseason varieties were on together, the flowers as a whole were of about average quality,

and as always, there were a few varieties that were finer than we had previously seen them. I think the yellow trumpets were hardly up to par and a number of the white trumpets and large leedsiis were lacking in their normal size and purity, but others performed beautifully. There was a tendency toward roughness in certain normally smooth flowers, induced no doubt by the long period of growth before opening.

We usually get less excited about the yellow trumpets than most of the other sections. Even though more of these are grown than all the other groups combined in commercial plantings, improvements are difficult to achieve. Diotima and Ben Hur are still among the best for early large flowers. Camberwell King has better form and texture and is one of the most beautiful of the yellow trumpets but unfortunately the stem is not as strong as it might be wished. Of medium height and blooming quite late, Kingscourt gave very nice blooms this year. It appears that Hallmark and Mortlake will be among the best garden flowers, and at the same time they are of exhibition quality. While we have not grown Frontier and Moonstruck long enough to fully acclimate them, they look promising, the latter being very large and of fine form, the color being an attractive sulphur or greenish lemon, considerably deeper in tone than Content.

Among white trumpets, Cantatrice remains near the top for beauty; Kanchenjunga and Broughshane for size and impressiveness; Ada Finch for earliness; Beersheba for quality at a moderate price; while Pearl Harbor and Silverdale are excellent garden flowers. Could we combine the good qualities of all of these in a flower that would give consistently good performance in all Daffodil growing sections of the country we would have achieved an ideal!

Most of the bi-color trumpets are lacking in some quality. Those which possess most merit have insufficient contrast to be distinct bi-colors. Be that as it may, there are some magnificent flowers in this section. Trousseau is a grand flower of splendid proportion and quality with intriguing color. In inclement weather the buff cheese tone of the trumpet is not always present but the other good qualities make it most desirable anyway. We highly esteem Content for its own beauty and for its value in breeding. Trostan is another excellent flower but none of these show much contrast in color. Rather short of stature and medium in size, Sincerity is of beautiful form and proportion with smooth finish. Effective as the name implies is a brilliant contrasty flower but in common with many of its class seems not to have a strong constitution. The beautiful large Spitzbergen should not be omitted although it could almost as well be called a white trumpet as a bi-color.

In considering the incomparabilis section, only a few will be mentioned although their numbers are legion. Those who acquire new red and yellow Daffodils thinking they will all be better formed more highly colored editions of Fortune will be due for disappointment as few of them possess the size and innate vigor of Fortune although many have better form and more color. Narvik certainly one of the best in that it has excellent form, jewel-like brilliancy of coloring, and extraordinary lasting

power; moreover, it is a rapid increaser and good grower although it may not satisfy those looking for the largest of flowers. Others with brilliant coloring and good form include Alemein, Bahram, Indian Summer, and Klingo. Krakatoa did not have its customary brilliance this year, perhaps due to the cool damp weather preceding blooming, a condition that fosters high coloration in some Daffodils. Not as highly colored but among the best in quality are Diolite, Hugh Poate, and Aranjuez. For exhibition, the perfectly formed flat cupped varieties Dunkeld, Garland, and Tamino are most effective. We would not want to be without some of the older all yellow incomps. such as Crocus, St. Issey, Trenoon, Carlton, and the very early Malvern Gold but with a trio composed of Galway, Golden Torch, and Sligo we have flowers that it appears may be difficult to improve. If we can achieve this quality in trumpet varieties, a real advancement would be made. Then there are the bi-color incomparabilis and among these we have some of our finest Daffodils. We still place Bodilly and Polindra near the top in this section and it will be long before we would want to part with the entirely different older John Evelyn. The newer Statue, Tramore, and Dunmore give much promise. Fermoy was quite the most striking big red and white flower we had this year. Kilworth looks very good. Red Hackle is a flower of exhibition quality and with grace of form that would make it a delightful cut flower. Of those with red rimmed cups, Tuskar Light is most striking.

Good barriis are not so plentiful. The best of those with yellow perianths is Chungking. Market Merry is very good but should perhaps be included in the 2a group. Numbers of good 3b's are appearing of which Limerick is likely the finest. Bravura, Crete, Paprika, Otranto, Tebourba, and Matapan are excellent red cupped flowers, much better than the older members of this group, the first two especially giving outstanding blooms. Blarney with its apricot salmon crown is one of the most lovely of all Daffodils and as it has performed here thus far should be one of the most lovely flowers for cutting.

So different in form from most other leedsiis as to make one think it should be with the 2b's is Green Island whose very circular perianth is reminiscent of Garland's as well it might be in consideration of their pedigrees. Green Island was not as smooth this year as normally, perhaps due to seasonal conditions, but was a magnificent flower nevertheless and should be of immense value for breeding. In the pure whites, perhaps Ludlow would be our choice although Zero would press it closely for position. Killaloe was not quite as good this year but it is doubtful if we have ever had any finer white flowers than it gave us a year ago. Although different, Rostov and Truth rate highly and we certainly look on Brunswick as one of the finest. It is in this group primarily that we have our best pinks although several good ones are classed with the bi-color trumpets. Wild Rose is just about tops for color while Rose of Tralee is one of the best in form. Mabel Taylor is certainly the most striking with its rosy pink banded heavily ruffled crown. It needs improvement in form but will certainly be used much in breeding. While we cannot venture to predict its usefulness, we have a few thousand seedlings com-

ing on from its pollen and look for some interesting things. Lough Maree gives promise of being an interesting and pretty cut flower. While it had not been impressive before, Rosegarland was one of the highlights this year as it gave very fine blooms of good size on quite tall stems, the crowns being beautifully flushed with pink. Pink o'Dawn, Dawnglow, and Show Tower are worth while additions if only for breeding but all appear to be susceptible to virus trouble. The two former are about the best quality flowers and among the largest of the pinks; the latter having a large bell like trumpet flushed salmon pink.

If we have a favorite classification it would perhaps be the small crowned leedsiis. Of these we like Chinese White with its large immaculate white flowers as well as any. Cushendall and its larger and later sister, Frigid, are truly dream flowers. Polar Sea, Silvermine, and Foggy Dew are a lovely trio of green eyed pure white flowers. Glenshane and Sylvia O'Neill are excellent alike for exhibition and decorative use. Moina and Dreamlight with their salmon orange rimmed eyes are lovely indeed.

We have grown comparatively few recent things from the other classifications but suffice it to say that we like Pepys and Mite of the cyclamineus hybrids; Cherie, Trim, Trevithian, and Golden Perfection of the Jonquils; Smyrna and Cantabile of the poets; and Swansdown of the doubles.

Much as we are interested in the best of the named varieties, we give priority in time and interest to growing seedlings. When a lot of seedlings comes into bloom we may look back with regret and wonder why we made such a cross, and not infrequently do we come to the conclusion before blooming age is reached that certain crosses were a waste of time, yet we have not been able to resign ourselves to their discard before blooming. Our good friend, Mr. Frank Reinelt exercises better judgment in such a situation. We can strive to rectify past errors but since *errare humanum est* we can anticipate that only a few of the crosses we make will give good things. 1948 gave us rather fewer good new seedlings than normal perhaps but there were several that looked promising. Out of King of the North x Content came several very nice sulphur colored flowers, one being very tall and strong stemmed with a flower of excellent form, the trumpet becoming almost pure white inside. Besides its novel coloring it had good substance. It was quite the most striking thing in its color that we have seen. There were quite a number of fairly good pink seedlings this year but two of the best were from a seedling of White Sentinel x Mrs. Backhouse crossed with Wild Rose. One of these in particular was deeper in color than anything I had previously seen being much deeper pink than Wild Rose. It was not very large but being in its fourth season or a three year old bulb as some growers would designate it, we look for more size another year. We had a very pretty white 4b from Alberni Beauty x Sylvia O'Neill and another quite good one from Dreamlight x Sylvia O'Neill. Several pretty white green eyed flowers came from Cushendall x Cantabile. A quite unique large cyclamineus hybrid came from Mite x Beersheba. There were numbers

of red and yellow flowers but nothing distinctive from what we already had.

While the Daffodil season just past certainly was not that perfect one that we always hope for and the percentage of good flowers may not even have been up to normal, yet we had a quota of good flowers and we will look forward anticipating a better season next year with more outstanding blooms and particularly that seedling without a fault!

NARCISSUS NOTES IN 1947

J. S. Cooley, *Maryland*

In 1947 there was an abundance of fine flowers in our plantings. Many gardeners, however, complained of the poor yield of flowers. This was especially true in cases in which the plants had excessive competition because they were too thick. The dry weather and high spring temperatures of previous years together with other unfavorable conditions were probably responsible for the poor yield of flowers.

The development of the red in the cup of such varieties as Dick Wellband, Francisca Drake and Fortune is an interesting study from year to year with different prevailing conditions. Some years the red color is very pronounced and some years it is decidedly lacking, so much so that one often wonders if his plant is true to name. The red cups were unusually colorful this year. The complex of environment that favors red color prevailed to a remarkable degree this year. There are probably a number of conditions that must react on one another to make this end result of a red or orange color in the cup. Observations seem to indicate that adequate moisture and a cool temperature are important elements in the development of red color in the cup.

Popular interest in *Narcissus* seems to be on the increase. The enhanced interest on the part of garden clubs in *Narcissus* shows together with the extensive advertising of the nurserymen would be expected to promote more interest in this group of plants among the flower lovers. At present one can not help noting the small number of gardens in which these flowers are growing. A casual survey at flowering time of the gardens of any community is likely to reveal that only a small proportion of the homes have *Narcissus*.

ALSTROMERIAS IN MICHIGAN

FREDERICK W. BOEHRINGER, *Michigan*

The Alstromerias took my fancy in 1941 when I received a catalog from Oakhurst Gardens with colored photos of the Chilensis hybrids. Having a greenhouse for winter growing plants, I bought a few roots, and grew them in pots the first year. This did not prove very successful as I was too busy in the spring of the year to give them all the attention that they needed. However, they did flower and produce small clusters. They were beautiful in vase arrangements and corsages. I left them in the pots until autumn and then decided to plant them in some available bench space. This house was somewhat cooler (50° F., nights) all winter and they did much better under these conditions. I had heavier clusters of blooms and the colors were better.

The *Alstroemeria* species and hybrids that I have grown do not seem to be particular about the soil used. I grew them in light sandy loam, giving them a light application of a complete fertilizer during their growing season. They began flowering in April and lasted until June. I have added many species and varieties since, and am now growing *Alstroemeria chilensis, A. Ligtu, A. angustifolia, A. pelegrina alba, A. Hookeri, A. tricolor, A. violacea* and *A. haemantha.* I also had *A. pulchella* and *A. aurantiaca,* but prefer the other colors. *A. aurantiaca* is a good durable bloom and is used a lot for bouquets. *A. pelegrina* started flowering the middle of March this year and has always been earlier than the other species and varieties.

This year I have some seeds of several crosses that I hope will give me some interesting hybrids. I also intend to try some roots out of doors to test their winter hardiness here.

BRODIAEA LILIES

ELMER C. PURDY, *California*

Born in a home surrounded by gardens to which came by purchase and contribution for trial and evaluation a great many of the bulbous plants hardy in the temperature zone, as a toddling youngster, I was taught to view each objectively and to consider its particular merits.

After 45 years of youth and adult life among flowers, I still love them all and know no favorites, yet some have qualities that particularly commend them and among bulbous flowers none is more dainty, easily grown, either in the garden or in pots; nor are there any more lasting either in the garden or as cut flowers than the BRODIAEA LILIES.

The botanical treatment of this group has been somewhat confused and complicated through the years. Some botanists have called them all *Brodiaea.* One botanist rather recently has gone back to the decision of older botanists and divides them under six generic names.

In a more recent treatment following an intimate study of fresh material, Dr. Robert A. Hoover separates them into four generic groups—

Brodiaea, Triteleia, Dichelostemma and *Triteleiopsis.* In cases where botanical accuracy is required, the correct scientific names should of course be used, but as a popular group name, BRODIAEA LILIES is appropriate.

The four genera included in the BRODIAEA LILIES comprise some 30 species found on the Pacific Slope of North America with the majority indigneous to California and Oregon.

They are very widely distributed and in California no section is destitute of one or more species.

The BRODIAEA LILIES were formerly placed in the *Liliaceae,* but Hutchinson (1934) transferred all of the *Allieae* to the *Amaryllidaceae.* The rootstock of the BRODIAEA LILIES is a corm and not a bulb, and the former term will be used in this article.

The leaves are grassy and basal, while the naked stem, in most species but one to a corm, is quite slender yet wiry and stands erect. There are from a few to many flowers borne in an umbel. In one group the pedicels are very short and so crowded as to form a dense head of florets. In another group the pedicels are many and 1 to 2 inches long to form a loose globular head, while in still another group the pedicels are from 3 to 5 inches or even 8 inches long, loosely arranged to give a broadly spreading umbel of from 5 to 50 flowers.

Height varies from 3 inches in one species to 36 inches and occasionally 48 inches in another. One odd species has pedicels radiating from a stem that does not exceed the ground surface, but the oddest of all is one with a twining and climbing stem of which I measured one specimen thirty-six feet long.

Colors vary from white, pink, rose, red, yellow and through every imaginable shade of blue from soft lilac through violet to a deep purple.

In what other group indeed, can one find more variety of height, flower form and color and once you have grown them you will say—"In what else such variety of dainty loveliness?". Add to this the fact that the flowers are among the most lasting of bulbous flowers either in the garden or as cut flowers and that they are excellent pot bulbs. I am sure you will agree that the Brodiaea Lilies are an exceptionally valuable group.

Culture: So you will fully understand the reason for some of the cultural hints that follow I should tell you something of the conditions under which BRODIAEA LILIES grow in the wild.

Here in the West the summers are entirely rainless. Rains come in the late autumn and continue through Winter and Spring. In the milder sections the corms start root action with the first autumn rains and leaves may show by mid-winter. In the colder sections root action may be deferred until winter or even early spring and the leaves may push through the soil as spring warmth comes.

Stems push up in late spring, which may be March in warm regions and late May in cold ones. They complete their flowering period and soon thereafter ripen to the ground so the corm has a complete summer rest.

In the West a garden must have some watering throughout the summer while in all states East of the Rockies there are summer rains. With good drainage the corms of Brodiaea Lilies stand summer moisture not too greatly harmed and in past years I have stated they may be left in the ground. However, I have come to the conclusion that nature knows best, and that if we are to afford the corms the greatest possible energy for future bloom and give them long life that we must give them a complete summer rest. This means either digging the bulbs at once they are ripe and storing them dry for replanting in October; or planting in pots or boxes, which may be sunk into the open soil in October and which may be removed when plants are ripe to be stored in the dry over summer and may again be sunk into the open ground in October. Many of the finer species are not costly and many gardeners prefer to leave the bulbs in the ground and buy a few new bulbs each fall as they do with tulips and hyacinths.

Soils: Brodiaea Lilies are found in a wide variety of soils, always well drained but many of them very poor soils. All will thrive in any well drained soil and a good loam or clayish soil, lightened with sand or grit suits them perfectly. They do not like heavily manured or fertilized soils nor soils too rich in humus but some manure or complete fertilizer, well mixed with soil, and placed under the corms and separated from the bulb by ¾ inch of clean soil will enhance results.

Situation & Planting: Unless planted in considerable numbers and quite thickly Brodiaea Lilies are of little value for color massing. They are much more effective planted in little colonies in rock garden, in odd corners or in crevices of natural rock. They are lovely among ferns, heuchera, columbine or other slender plants. They should never be planted under or among rampant or choking plants that will over run and smother them. Corms may be spaced 2 to 4 inches apart, and covered 2 to 3 inches over tip of bulb; 3 inches in very light soils.

Brodiaea Lilies are perfectly hardy without protection. The tender shoots cannot push through a mulch in case of failure to remove early enough in Spring and would hence be smothered. I advise against protection or mulch. Planting time is much more important.

Time of Planting. Corms you order will be received some time after Sept. 15. In mild climates they may be planted at once. The corms are packed dry and retain full vitality even if planting is deferred up to Nov. 15. In the event of early rains and a warm autumn, corms planted early may start prematurely. Therefore in all colder regions, (and in this I include all but the Southern and Pacific States), I recommend that planting be delayed until really cold weather from late Oct. to Nov. 15. Nature takes care of her own and the late planted bulbs will remain dormant over winter to start root action and sturdy growth when soil conditions and temperatures are proper just as do your local native bulbs in the wild.

Watering. Although Brodiaea Lilies may be naturalized with a minimum of natural moisture, in the garden results are enhanced by giving them abundant moisture whenever natural moisture is deficient

during the growing and flowering season after which they should be dried off.

In Pots or Boxes: The corms will do well in ordinary friable garden soil. One may use a very rich potting soil provided the corms are surrounded with sharp sand. Potted BRODIAEA LILIES may be sunk into the garden in late Oct. or be placed in a cold frame.

In Greenhouse: The corms may be potted and set aside to root just as you would handle tulips or other potted corms and bulbs. When well rooted they may be brought into heat gradually and finally in the house at 55 to 60 degrees. They will perish with bottom heat or heavy forcing. All that you can do is to hasten bloom by bringing spring conditions to them sooner.

The following is a list of recommended species and forms limited somewhat to those usually obtainable from dealers with the mention of a few very desirable ones not currently to be had. Descriptions are popular rather than botanical. Those who would like to know the other species and those scientifically inclined who prefer botanical descriptions are referred to the monograph of Dr. Hoover. As already indicated, botanically there are four genera, *Brodiaea, Triteleia, Dichelostemma* and *Triteleiopsis,* but horticulturally they may be considered as a single group, the BRODIAEA LILIES. On an ecological basis they may be grouped into HARVEST BRODIAEA LILIES and WOODLAND BRODIAEA LILIES. Until Dr. Hoover recently straightened out the matter, the botanical names in some cases were confused. In the list below, the synonyms are given in parentheses after the correct botanical names. Species starred (*) are not currently obtainable.

HARVEST BRODIAEA LILIES

These are found in nature in open fields in full sun and often in rather heavy soils to which they are tolerant. They will stand light shade and the flowers last longer there. All flower very late, mid-June through most of July in California.

Brodiaea elegans (syn.—*Brodiaea grandiflora)* ELEGANT BRODIAEA LILY. Umbels 3 to 11 flowered, the flowers standing erect on 6 to 12 inch stems are very glossy deep blue and very lasting. Naturalizes easily in any clay soil.

Brodiaea californica; CALIFORNIA BRODIAEA LILY. Stems 1 to 2 ft. high and stout; bear erect umbel of a few to 12 flowers of deep blue tinted lilac in one form while in another the flowers are soft lilac-pink. Likes very liberal moisture. One of largest and tallest species. Flowers very late.

Triteleia peduncularis (syn.—*Brodiaea Eastwoodii).* To 18 inches tall with an erect dense umbel of milky white, lilac-veined flowers. Loves a moist spot where it rapidly increases from bulb offsets. July.

WOODLAND BRODIAEA LILIES

These are usually found in open woods but are very often seen on sunny slopes or in open fields. They do equally well in sun or shade but for lasting blooms a situation in light shade is preferable.

Triteleia Bridgesii (syn.—*Brodiaea Bridgesii).* This grows from 8 inches to as much as 24 inches in height. Umbel is many flowered and broadly spreading, often with as many as 50 flowers. Flower is soft violet blue with a reddish violet over shade, a combination very hard to describe but very lovely. Blooms May-June according to season and region.

Dichelostemma pulchellum (syn.—*Brodiaea capitata).* Slender stems 6 to 15 inches tall, the flowers in dense heads of violet blue. This is unique in producing from two to as many as a dozen stems to each bulb. One of the easiest of all to grow.

**Dichelostemma idamaia* (syn.—*Brodiaea coccinea)* FIRECRACKER LILY. Stems from a foot to three feet tall with pendant umbel of long vivid crimson flowers so greatly like the bunches of Chinese firecrackers that FIRECRACKER LILY is the popular name throughout its extended range. It is native entirely of open woodlands. Both unique and lovely.

Triteleia crocea (syn.—*Brodiaea crocea)* GOLDEN BRODIAEA LILY. Four to 12 inch stems with umbels of 4 to 8 or even 15 flowers, of golden yellow, with a purple mid-vein. A very hardy species.

Triteleia hyacinthina (syn.—*Brodiaea lactea).* There are several varieties varying in height from six to 24 inches but the more usually obtainable form is 6 to 12 inches high with a rounded umbel of from 10 to 40 flowers, pure white with a greenish mid-vein. Naturalizes readily both by offsets and self-seeding.

Triteleia laxa (syn.—*Brodiaea laxa).* One to two feet high with a broadly spreading umbel of 8 to 50 flowers of clear soft blue. One of California's finest blue flowers, and very lasting.

Dichelostemma volubile (syn.—*Brodiaea volubilis).* CLIMBING BRODIAEA LILY. This is commonly called the "Twining Hyacinth." It usually grows under scrub brush and its long twining and climbing stems push up through the brush so the dense heads of lasting rose-pink flowers are borne over the brush in full sunlight. Must be grown where it can climb or be given a support.

**Triteleia ixioides* var. *scabra* (syn.—*Brodiaea ixioides* var. *splendens).* This is popularly known as "GOLDEN STARS." Umbels are rounded with flowers upright like stars of deep creamy yellow edged golden yellow. Very lovely and it is hoped it will be available to gardeners before long.

No BRODIAEA LILY is without beauty and each has its own character and individual loveliness but in a popular article there seems no point in describing the many species not procurable by gardeners and I can only express the hope that some day there will be.

No words can adequately describe the grace, loveliness of form and color of each of these fine species. They must be seen to be fully appreciated and I hope I may lead some who have read these words to venture and thus share some of the enjoyment I have had through each of many Springs as each of these lovely species came into flower.

CRINUMS FOR GARDEN AND GREENHOUSE

WYNDHAM HAYWARD, *Florida*

The CRINUM LILIES are most certainly "he-man's" bulb, many of them ranking among the largest bulbs in the world, and two of them, *Crinum asiaticum* and *C. amabile,* growing to a truly impressive size that is no less than "colossal," as they say in Hollywood.

On the other hand there are species that are small and dainty, blooming nicely in a six-inch pot. But most of them are suitable only for culture in the open ground, and that limits their usual garden use to the lower South, with two or three exceptions, notably *Crinum bulbispermum,* (formerly known as *C. longifolium* and *C. capense)* and some delightful hybrids of this species, which have inherited some of its hardy character, as *C. Powelli* and its congeners. Figure 204 shows a *Crinum* received in a lot of bulbs from Kenya, and it may be a hybrid for its seeds are infertile. Figure 205 shows an unidentified *Crinum* species from Burma.

A good many garden lovers in the Lower South have seen and lived with Crinums all their lives, without knowing the bulbs by that generic name. They are fairly common along the coastal lowlands of the South Atlantic, around Florida and the Gulf Coast to Mexico. In warmer parts of the upper South, and up into Oklahoma and Missouri, a few of the tougher species may be found in protected locations. The species *C. bulbispermum* and its hybrids are half-hardy and will survive in gardens with some protection up to Philadelphia and even New York. In cold climates where the ground freezes they can be covered with sand or ashes in winter, or the bulbs can be lifted and stored dry in a warm part of the cellar over winter.

The Crinums are showy things, for the most part easy to grow and long lasting. They propagate readily by offsets in the case of mature and well-established bulbs, and reward the garden lover with a rich harvest of floral beauty and perfume as well, in some cases, besides handsome greenery.

They are the lazy man's bulb supreme, as they will thrive for years in any good soil with only a modest weeding and cultivation now and then, when the spirit moves the gardener. Most of the species will grow faster and bloom more "splendiferously" in moist locations on heavy ground, but the average *Crinum* takes well to ordinary garden soil, even high sandy land. On the higher and dryer locations the Crinums may require more watering and more fertilizer than in a lakeside location, but they will still give a good account of themselves. If given half the care and attention that the average rosebush receives, any self-respecting *Crinum* will return big dividends for the investment.

Many garden-lovers have found that they could do pretty well with a planting of Crinums all alone, with nothing else in the bulb garden, but that would require a large supply of bulbs. The Crinums are herbaeous plants, with showy, lilium-like white, pink, rose or striped flowers, having long or short necks and producing bulbs which weigh up to 25 pounds or more each in the largest species.

Most of them are spring and summer blooming. A few are more or less deciduous, losing their leaves in autumn and winter. They are native to both hemispheres and at least one species inhabits the limits of the continental United States, *Crinum Americanum,* with its pretty, pinkish white, star-like flower, found growing along stream banks in the deep south from Florida to Texas. In Florida we have seen it along the St. Johns River and southward to the Everglades where it grows by the thousands. *Crinum americanum* is a water-side or aquatic plant, and requires a rich, moist soil. It is a shy bloomer and does not adapt itself readily to garden conditions or pots, and is not recommended for general garden use. The bulbs are small, leeklike, and stoloniferous, seldom more than an inch or two in diameter, and a foot tall, to the top of the narrow leaves.

Most popular today are the *Crinum* hybrids, of which dozens have been reported in horticultural literature since the time of Dean William Herbert, the great Amaryllis hybridizer and student of the early 1800's. But unfortunately, most of these hybrid Crinums have been lost with the passing years, or at least lost by name, and their origin remains cloaked in mystery when they turn up. The *Crinum* collector who ranges far and wide over the countryside of the Lower South comes on Crinums here and there that do not answer the descriptions of any known species and which patently are hybrids. Some of these may be natural hybrids of self-sown seed, created by some passing butterfly, or they may be remainders of some 19th century hybrid of the many reported in various gardening publications in the last 150 years. It is impossible to tell.

The two largest Crinums, *C. asiaticum* and *C. amabile,* are somewhat alike in foliage and bulb character. They are excellent for landscape specimens, foundation planting and sentinel lines. They can even be planted as a hedge or accent clump at the side of the lawn. *C. asiaticum* has large umbels of white flowers with narrow, linear petals. There may be 30 or 40 in an umbel, on stems two to four feet tall. The bulb is leeklike, 1½ to 2 feet long, and bears a head of many three-to-four-feet leaves. The flowers are very fragrant.

C. amabile is supposed to be a natural hybrid of *C. asiaticum* and some milk-and-wine-colored species. It is like *C. asiaticum* with larger flowers, having petals purple red on the back and lighter on the inside. It has a strong perfume, and a single scape may be too much for a room. The individual flowers of this and the preceding species may be used in small vases around the house, as the huge umbel presents quite a problem to the flower arranger, while very showy in the garden. Blooming scapes of *C. amabile* plants need a strong support as they weigh five to ten pounds at maximum and flop to the ground when the flowers open. When grown in poor soil the bulbs and scapes are not so portentous.

There is a large group of *Crinum* species which may be classed horticulturally as "Milk and Wine Lilies," and are popularly known under that name by many garden lovers. They include the showy *Crinum scabrum, Crinum zeylanicum,* common in the Florida countryside, *Crinum Kirkii, C. erubescens, C. Sanderianum, C. fimbriatulum,* etc.,

more or less similar in general characters, having umbels of rather trumpet-shaped flowers with pink, rose or rose-purple stripes on the petals, and blooming in late spring and summer. They are the commonest of the Crinums and there is much confusion in their nomenclature in gardens. At the present time there is not sufficient data available to assure prompt, certain identification of most of these "MILK AND WINE LILIES," which are mixed and scattered far and wide over the landscape, particularly on old country places, where long rows may be seen blooming in early sum-

Fig. 204. Infertile *Crinum* received from Kenya; possibly a hybrid. Photo by Wyndham Hayward, Florida.

mer throughout the Lower South. They make excellent cut flowers and many of them are perfumed. Country folk call them ANGEL LILIES, WINE LILIES, HONEY AND WINE LILIES, etc. The flowers of a few species are wide open at their best, almost like *Amaryllis*. Practically all species are mainly night blooming, that is, they open their flowers in the early evening, are in best condition in the late evening and early morning and the individual flowers usually fade somewhat during the heat of the

following day. Early in the morning is a good time to see them at their best.

Two other interesting species are *C. Moorei* and *C. giganteum*. There are several species not well understood in this country close to these. *C. Moorei* is possibly the most delicately beautiful species of all, in flower, with bluish-pink tinted trumpets on a slender scape above a handsome crown of leaves. The bulbs have a decided, rather long neck, and the foliage requires shade. It is deciduous and the bulbs are dormant in summer. Hence, as tender tropical plants (from South Africa) they must have protection in winter from cold damage to the foliage or the growth will suffer. It is an excellent greenhouse plant, too. It is one of the parents of the interesting bi-generic hybrid with *Brunsvigia rosea* (Lamarck) Hann. (syn. *Amaryllis belladonna* Ait., non Linn.) called *Crinodonna Corsii* Stapf (syn.—*Amarcrinum Howardii)* made first by the late Ragionieri and again by the late Fred Howard.

The infertile clone resulting from the cross made in Italy by Attilio Ragionieri is regarded as inferior in garden quality to *Crinodonna Corsii* c. Fred Howard. It blooms in late summer with a lovely umbel of pink flowers and the same heavenly perfume as the Cape Belladonna. It too is infertile.

Crinum giganteum (Figure 206) is not a huge bulb, but attains large proportions. It has a habit of blooming in midwinter during warm spells, but must have protection from frosts or the foliage will be lost and the bulb growth retarded. Its flowers are somewhat tulip-shaped, white with spreading petals. It is more particular in habits than most of the other Crinums, the same as *C. Moorei,* and enjoys part shade in rich, moist soil.

The ubiquitous *Crinum bulbispermum, (C. capense* and *C. longifolium)* is found in many old gardens over the South up to Washington and even farther North. It has characteristic glaucous-green foliage, with flowers rather funnelform, a dozen or more to the umbel, pink striped, or pure white in the variety *alba.* This may well be the commonest and most widely dispersed *Crinum* in the country. The pink type seeds profusely and has entered into the parentage of many of the hybrids, mainly the *C. Powellii* group.

This Powellii group contains several of the most valuable garden crinums for the greenhouse and Lower South, including the pink *C. Powellii* (type), *C. Powellii* var. *album,* pure white, an excellent substitute for Easter Lilies in the spring, also *C. Powellii* var. *Krelagei,* a lovely pink produced in Holland, and Cecil Houdyshel's stellar production, *Crinum* c. Cecil Houdyshel. Mr. Houdyshel is a California hybridizer who has introduced a number of fine hybrid crinums, including Virginia Lee and Gordon Wayne, but his Cecil Houdyshel, a vigorous, handsome bulb, with tall stems and large umbels of rich pink, rates just about tops in the *Crinum* field today. A mature bulb may be six inches in diameter, and will bloom half a dozen times a year, starting in early spring and continuing into middle summer.

There are two or three Crinums found in the South which are related to *C. giganteum,* one of them popularly known as CHRISTOPHER LILY. It blooms in summer only once or twice a season, multiplies rapidly, and has smaller bulbs than the true *C. giganteum.* As in the case of *C. giganteum,* the anthers of the flowers turn black after shedding their pollen, which gives a striking touch to the pure white flowers. The late Theodore L. Mead of Oviedo, Fla., a pioneer horticulturist who once had a large

Fig. 205 *Crinum pratense* from Burma. Photo by Wyndham Hayward, Florida.

Crinum collection, thought this dwarf *C. giganteum* type was a hybrid of some kind.

The hybrid ELLEN BOSANQUET, a deep wine-colored *Crinum,* is one of the best creations of the plant breeder's art in this genus. It was originated along with the Powellii type, LOUIS BOSANQUET, by the late

Louis Percival Bosanquet of Fruitland Park, Florida, and is now well known around the Gulf Coast. The bulb is large and vigorous, and the flower umbels generous, exotic and colorful. EMPRESS OF INDIA is a rare hybrid of the MILK AND WINE type, having striking large flowers, up to eight or nine inches across when fully expanded. It is more strictly a night bloomer, as is a California hybrid, WHITE QUEEN, which may be

Fig. 206. *Crinum giganteum* under outdoor culture in Florida. Photo by Wyndham Hayward, Florida.

one of Burbank's productions. This has numerous trumpets of a rather drooping form of a lovely porcelain white. It is beautiful in the late evening or early morning, but fades quickly with the hot sun of summer. Other desirable hybrids include the rare *Crinum Zimmermani,* produced

by E. P. Zimmerman of Carlsbad, Calif., and the late Dr. Henry Nehrling's choice jewels, MRS. JAMES HENDRY and SOPHIA NEHRLING, with white, expanded trumpets tinged with pink. These have been illustrated in old numbers of "Herbertia."

Other popular hybrids are the richly perfumed PEACHBLOW, pinkish white, on long stems, bred by the late T. L. Mead of Oviedo, Fla., and J. C. HARVEY, a thrifty-growing pink, of shy blooming nature, said to be a California bulb originally.

GROWING AMARYLLIDS IN POTS

EDITH B. STROUT, *Chairman*
General Amaryllid Committee

I began growing amaryllids in pots because of necessity. The first amaryllids I ever acquired, some *Amaryllis xJohnsonii* and hybrids, just would not grow in our heavy adobe (clay) soil that was dry in summer and wet in winter, but by purchasing a little top soil from the florists and growing in pots I was able to control their growth better. Then in the fall of 1943 the house which we were renting was sold, and like many others during this period we were forced to move. The new house we were fortunate enough to rent was nicely landscaped and had some very nice flower borders. Not being the kind of tenant who digs up the nice shrubs planted by the landlord to put in my own particular pets, I decided to grow all my flower bulbs, including many *Iridaceae* and *Liliaceae* in boxes, pots and cans and place them in the enclosed back yard.

From my own experiences, it is my contention that any amaryllid can be grown in a pot, if the word "pot" is a general term to denote a container of some sort. Of course, like everyone, I have had some complete failures, but I believe this is my fault in not finding the right soil and moisture conditions rather than pot culture, and I shall speak of these in more detail later.

From the few books, magazines and catalogues that have come into my hands, amaryllids generally seem to have been classified into two groups, those that were tolerant of or liked their roots pot-bound, and were therefore considered easy for pot culture; and those that must be planted in free soil. Of this latter group, it is my own personal opinion that it is not the free soil that counts, but the *depth* of soil, for some of these seem to send their roots straight down rather than laterally. Still speaking in general terms, a depth of 10 inches seems to satisfy the needs of most of these bulbs wanting more root room.

One must, of course, also take into consideration the soil and moisture requirements of the various bulbs. I am sure that some of my failures to get bloom have been due to insufficient water. Clay pots dry out very quickly in my section of the country where it practically never rains from May till October, and to keep the plants moist it is often necessary to water twice a day. Putting the pots in deep dishes, such as mixing bowls, will help on this, but again the expense of the extra bowls must also be considered for the small grower who must strike a balance between get-

ting a new bulb or getting bowls! I've often found that the containers cost more than the bulbs!

Tin cans will hold the moisture better in the summer, but again they also hold it better in the winter, and our rainfall here during the months from October to May will vary between 26 inches to 76 inches. To give the pots or cans sufficient drainage so they won't be flooded when we get 76 inches of rain in 7 months, most of it falling in 3 months, also means more difficulty in keeping them wet in the very dry summers. Sinking the pots in the ground was out of the question, for the only ground available was the borders, already heavily planted. A mulch of peat moss or redwood bark was discarded as being too expensive if it was to be effective. So I've grown mine the hard way—containers set on the hard packed ground and frequent waterings in summer.

When a shortage of clay pots developed in this section during the war years, I had to resort to cans and wooden boxes. I like the wooden boxes, but they aren't as portable as pots and they do decay and this seems to encourage more bugs (which also like the bulbs), as well as a mold. The mold can be controlled by watering with a solution of Clorox using 2 teaspoons to a quart of water.

The boxes I used were those easiest to get—fruit lugs from the stores, usually about 6 inches deep. Sides and bottoms are very thin and they rot within two years and must be replaced. For deeper boxes, I used apple boxes, reinforcing the thin bottoms, or used the thick ends of orange crates to make a box 10 inches square. Boxes made of heavier wood, and painted with preservatives, would last much longer. The usual seed flat I've found too shallow to be of much service for anything.

Before listing the amaryllids individually, I want to mention that a number of bulbs, like the well-known *Narcissus,* can be made to bloom beautifully the first year they are planted in pots, but by "pot culture," I mean growing them continually in containers with no shift to free coil to "recuperate"—they must live always, year in and year out, in pots, and to be successful must flower regularly. Also, in my pot culture, I do not discard the old soil and add new each year, for I've felt pot culture should imply growing always in the same pot and soil at all times. Many of my bulbs have been in the same pot and same soil for five years and are still husky and vigorous. I do give new soil, of course, when it is necessary to transplant when taking off offsets or putting into a larger container because of increased growth. Since amaryllids are usually heavy feeders, the food in the original soil is soon used up and growing the bulbs in containers continuously means that one must fertilize heavily to supply the necessary nourishment.

I use all kinds of fertilizer, whichever seems handiest at the time; liquid cow or sheep manure, commercial fertilizer such as "Vigoro" dissolved in water, bonemeal, or "Plant Chem." If my health, as well as time, permits, I try to fertilize once a week, alternating liquid manures with "Plant Chem," for I've felt the latter could furnish some of the trace elements needed. But sometimes the pots have had to be sadly neglected for weeks and even months at a time.

Agapanthus come first in what I call the "easy group." These have been well known in colder sections as a tub plant, but the amazing thing to me was how well they behave in small containers. Dr. Traub sent me a seedling *Agapanthus* species which I potted it in a gallon can. It seemed happy there, so I didn't disturb it the first year, and the second year I

Fig. 207. *Hymenocallis caribaea* from Saba Island, West Indies. Photo by Edith B. Strout, California.

was too busy to transplant it. So I was much surprised to see it send up a stalk 40 inches high with a 10 inch umbel. No new soil has ever been added and the roots have never been disturbed. Now there are four blooming sized plants and a good number of seedlings, all in the same gallon can! *Agapanthus mooreanus* var. *minor* has five plants in a half

gallon can and bloomed well, and a seedling *A. longispathus* also bloomed in a half gallon can. Having dug *Agapanthus* in free soil and seen their big fleshy roots, I would never have believed they could bloom in such small cans, but they have and seem to like it. Of course, as is usually the case with most amaryllids, they are heavy feeders and should be fertilized well though I have given these less fertilizer than any of my other amaryllids. The half gallon fruit juice cans have greater *depth* than a clay pot of the same diameter, but I believe my success in getting these to bloom so well was keeping them well soaked in the summertime. The *Agapanthus* species from Dr. Traub particularly seems to need lots of water. Needless to say, a group of six white *Agapanthus orientalis* in a 5 gallon oil pail do very well also.

The *Allium* species should be easy in pots. *A. triquetrum* I know will grow in anything, for it seeds so easily it becomes a pest out here, though I can't help but admire its airy bells. I have had *A. tanguitum* the longest, and this did very well in a fruit lug, but now the bottom of the box has decayed, so it is really only a small raised flower bed. I haven't been able to give the other alliums a fair test for I've had most of them only a year. None of them this year has been really successful. Last winter the soil in the pots of Alliums started heaving during a freeze, but the plants didn't seem to be hurt thereby. *A. oreophilum, A. ammophilum* made an effort, but are not really happy, though they did bloom. *A. cernum* and *A. montanum* all blast and I have been unsuccessful in getting the buds to open.

Amaryllis Linn. (ex hippeastrums) are well known as pot plants, the usual procedure being to leave half of the bulb above ground. While I grow most of the hybrids this way so I can use a smaller pot, I've noticed that so many of my seedlings particularly of the narrow-leaved group of *Amaryllis* will pull themselves *down* to the bottom of the can. If their urge to be below the surface is so great, I can't see why the bulbs should not be grown that way, if one had a large enough pot to allow ample root room. Those I've tried planting so all the bulb was covered have done as well, if not better, than those planted with the part of the bulb exposed. I've heard reports that these hybrids would not bloom unless root bound, but this is not true. I have sometimes planted a small bulb only 1½″ in diameter in a 8″ pot to allow room for future growth of bulb and offsets, and have had it bloom the first year long before the large pot was full of roots. And they continued to bloom yearly, although no new soil was added—they are left strictly alone. But these *Amaryllis*, and particularly the hybrids, are very accommodating plants, and will adapt themselves to many varied conditions, even adverse ones.

The *Amaryllis* species, however, are not so tractable. *A. belladonna* Linn. (syn.—*Hippeastrum equestre* Herb.) and its hybrids, always rot for me if planted partly exposed, but do well if covered with soil. The *A. ambiguum,* an *A. elegans* hybrid I believe, seem to want to be planted well below ground—at least I've been unable to get it to bloom in a pot. *A. elegans* I got from the West Indies and it grows and flowers, but there are few bells on the stalk and it is not particularly happy. Incidentally,

I dug some of these, and also *A. belladonna,* in the West Indies in their native habitat, and found the bulbs from 4 to 9 inches *below* the surface of the soil! I think *A. elegans* particularly should be planted deep to be happy, for then, like the liliums, they can have cool feet but their heads in the sun, and I'm not sure but what growing them like liliums would suit them better. Though I have a number of other species, many are still only small offsets or seedlings and few have flowered, so I have much to learn about their requirements.

Clivias are another well known pot plant and I can add little to what is already known about them. When I first bought mine, I found the roots so long that I just could not push them into an 8″ pot or I would have broken the offset which had started for form, and which was pointing straight down; so I had to get a 10″ pot for it. The plant *(C. miniata)* grew and thrived, but did not bloom. I had been bringing it in during our rainy winters and keeping it at room temperatures. A correspondent informed me that they must be kept at a winter temperature of not more than 45° F., or they would not bloom. So the next winter I put mine under the back porch where it could get some protection from the rains and still be cold, and since then I've had bloom every year! Whether it has been the lower winter temperatures, or the fact that by now the pot had gotten full of plants, and also roots, I do not know, but suspect it is a little of both. I now have three blooming size plants, 6 offsets, and I've removed at least four offsets. A 10″ pot full of clivias, with several stalks in bloom at once, is a fine sight and can still be moved around to display to advantage. Personally, I could not carry a larger pot than 10″ and consider this the largest pot that I can use.

Cyrtanthus lutescens is another well-known pot plant. When I bought my bulbs, Mr. Orpet advised me to plant as deeply as possible in a 4″ pot. I did so, and have had the bulbs in the same pots (without a change of soil and have given little fertilizer) for some 4 years. I find now that I have at least 12 bulbs in a 4″ pot and 15 bulbs in a 5″ pot. I get scattered bloom all through the year, December, February, April, June, July, September, or what have you. When I bought these I understood that they were winter bloomers, being dormant in the summer. Since I keep on watering them, all summer, they never go dormant and buds are apt to appear at any time, temperature seeming to have little effect. I have not kept any kind of record as to how many times a year each bulb blooms, but the potful as a whole is very successful and produces blooms frequently. Slugs dearly love *Cyrtanthus* and will come to them before eating any other plants. The flower buds particularly seem choice deserts to them, and therefore much vigilance is needed in the "slug season."

Cyranthus angustifolia is not so easy. It seems to like a very sandy soil and only once in five years have I gotten it to bloom. It was a much more decorative garden subject than *C. lutescens* and I regret that I am unable to see its fine bloom oftener. I do not know if its failure to bloom is resentment at being confined or due to some other factor of soil or moisture.

Cyrtanthus O'Brienii looks as if it would be among the easy ones to grow, though not as prolific as *C. lutescens.* It bloomed the first year I had it, and last winter put out a bud during a deceiving warm spell, only to have a cold wave freeze the mother bulb. Now I must wait till the offsets are large enough to bloom before discovering if it will be free flowering for me or not.

Eucharis have been easy for me. The bulbs I have came from Saba Island in the West Indies, and though I have not been able to get them identified, I believe it is probably the common *E. grandiflora.* These bulbs are supposed to be planted 4″ below the surface, and have plenty of root room below, a 12″ deep container usually being recommended. My own experience has been otherwise. When I received them, they were sent as "white lilies" among a large shipment of assorted *Amaryllis* bulbs. Though I had never seen a bulb like these, I knew they were not *Amaryllis,* but I planted them in the same soil and in the same way as the other *Amaryllis* received. Some had flowered during the two months journey in the mails, and most had started leaf growth. All were very difficult to root. As soon as the leaves were developed, it became evident that they were *Eucharis.* As my soil mix for the *Amaryllis* had considerable lime in it, I thought best to transplant the *Eucharis* to a soil having more humus. One pot, however, looked so happy that I did not disturb it. I remembered the very good advice Mr. Houdyshel had given me, to the effect that if a plant seemed happy with the culture being given it, to leave it alone regardless of other methods advised by experts. This particular pot had originally four bulbs planted with part of the necks above soil, and in a 6″ bulb *pan!* Now there are 6 blooming sized bulbs and 7 offsets, so crowded they are starting to push up the soil out of the pot, but these are the only *Eucharis* that have bloomed for me! While most writers agree that the bulbs should be crowded to bloom, everything I've read has indicated that the bulbs would not bloom if so near the surface, but mine certainly do. They apparently want much heat and humidity to bloom, for mine bud only during our hottest weather, on those few occasions when our nights are warm too, and in winter if the baby is sick so I keep the rooms hotter! Not at present having a greenhouse, but having to winter all my tender plants in the bedrooms, I am unable to give some of them the heat and humidity they like. But from this one crowded pot of *Eucharis* I have been getting bloom two or three times a year for the past three years.

When I transplanted the other *Eucharis* into a soil containing more leaf mold, they definitely didn't like it, and though they grew, they were not happy. Some of them I had to dispose of for I did not have room to winter all of them inside the small house. The rest I tried to winter outside. Unfortunately, the winter I chose was the coldest this area has had for some years, and all but one pot froze or at least rotted because of heavy rains and cold. One group in a gallon salad oil can was kept under the back porch against the side of the house where it got some warmth through the walls, the bulbs being planted some 4″ deep. The plants in this can survived but the bulbs are not as happy as those in the 6″ pan.

If *Eucharis* can be given sufficient warmth, they make wonderful pot plants, for the leaves are tropical looking and decorative even when not in bloom.

Haemanthus coccineus has been of easy culture here. I potted the large bulb I received in an 8″ pot, and except for a little fertilizing, it gets no attention whatever. It grows in the winter when we get our rains, and is dormant all summer in the dry season. I should think it would naturalize here as well as the *Brunsvigia rosea* (Lamarck) Hann. (syn.—*Amaryllis belladonna* Ait.; non Linn.). My bulb of *Haemanthus coccineus* has produced two offsets, one at least of blooming size. While *H. coccineus* is an interesting and easy pot plant, it is not as decorative as some of the other *Haemanthus.*

H. albiflos should be as easy as *H. coccineus* and very interesting, but the narcissus fly got the small one I had. A *Haemanthus* I got under the name of *H. puniceus* seems very happy in its 6″ pot but I have had it only a little while.

A *Haemanthus* that came to me via the West Indies, is the most decorative of any I have, with four to seven broad thin leaves spreading out from a 10″ tall stalk which is heavily spotted with maroon dots. The green canopy lasts about ten months before the bulb is dormant for a month before flowering. These *Haemanthus* are summer flowering and nearly evergreen, seem to want some shade and moisture, and have been happy in pots even of small size.

I have some seven or eight different varieties of *Hymenocallis* which I have obtained from various sources but have not identified definitely, and most of them do well in pots varying from 4″ to 8″ depending upon size of the bulb. *Hymenocallis caribaea* is shown in Figure 207. Some of the Hymenocallis are swamp plants and of course, require much moisture when potted. Most of mine seem to require a long growing season and want to be kept evergreen. All bloom only during our warmest weather. All are very fragrant but what interests me most is how different the fragrance is in the various species, or varieties, which I have. I'd like to see these classified by fragrance. I have not tried digging these bulbs and keeping them dry like *Ismene,* but no doubt some species would thrive under that culture.

Ismene (Figure 208) are potted and forced into bloom by many people living in the colder climates. I have grown mine only in large boxes, such as an apple box, planting 6 or more in only part of the box (usually *Sprekelia* and other bulbs are also placed in the same box) and they have thrived and bloomed well. They are attacked by narcissus fly, however, and some have been lost to that pest. I've planted my large ismenes about 4″ deep in the box, and upon digging find the large roots spreading out over the flat bottom. I have usually dug these in fall and stored them inside the house where the bulbs could be kept warm, for the boxes were usually wanted for winter growing bulbs. This is not the same as growing them continually in containers with no change of soil, but lack of space and pots has prevented me growing them any other way.

Everyone is familiar with forcing daffodils in pots, but for growing year after year, I've found they need more root room than can be furnished in a 6″ pot. I've had some "China Lilies" *(N. tazetta var. orientalis),* Paper Whites *(N. tazetta)* and *leucojums* planted 2″ apart and 4″ deep, with grape hyacinths *(Muscari)* as thick as they could be planted at the 2″ level, in an apple box. Here they have thrived and flowered for four years, the soil and box replaced once during that time. They do not seem to mind how close together they are as long as there is plenty of soil and depth *under* them. In a deep straight sided container such as a crock or a fruit juice can, I see no reason why they can not be grown permanently in the container.

The snowdrops *(Galanthus)* will grow in the standard fruit lug very well. Mine have resented the deep shade I gave them but none the less have bloomed repeatedly.

Nerines are always classified as fine pot bulbs, but in common with many other people, I have had few blooms. The only sure bloomer is *N. massonorum,* which hasn't missed a single year blooming for me and multiplies rapidly, sets seed, and generally seems a very desirable plant. From two bulbs given to me a couple of years ago, I now have many, and last fall had 8 flower stalks in a 4″ pot, and the pot does not seem crowded with plants yet. The flowers are so small that a great many are needed to even be noticed when outside, but a 4″ pot in full bloom is small enough to make a good table centerpiece or other inside decoration.

As this is being written, *N. rosea-crispa* has decided to bloom, which makes the second nerine I've been able to flower. I've waited three years for this one to show its beauty.

N. Fothergillii major I have had even longer and I've had no bloom from it. *N. sarniensis* I received this last summer so cannot tell yet what it will do for me; and even *N. Bowdenii* and the little *N. filifolia* do not bloom. *N. massonorum* bloomed when there was only one bulb in the pot and has bloomed repeatedly ever since. Some of the others are in 2 or 5″ pots, some crowded and root bound, others not, but still no flowers. However, this failure to get bloom may be due to wrong soil or insufficient moisture, or both, but I cannot call such shy bloomers good subjects to grow in pots, particularly if one wants flowers.

Sternbergia lutea makes a fine pot plant and can be left undisturbed for a number of years, if the pot is fertilized often. In fact, these bulbs resent disturbance and want to be out of the ground as little as possible, seldom blooming the first year after planting. But once established I find they grow readily and easily in the pots, are reliable bloomers and multiply well. If one likes one's table center piece growing instead of cut and dying flowers, these can make a very attractive pot at flowering time.

Tulbaghia violacea grows very well in pots. I planted about 10 seed in a 5″ pot and the first plant bloomed 11 months after planting the seed, and by 13 months from planting, all had bloomed. They seem to need much moisture, however, and if kept watered bloom off and on throughout the year here. I have never objected to their strong garlic odor in the

garden, but do not like them inside the house, though some people may like them in any situation.

But *tulbaghia fragrans* has my hearty recommendations as one of the very finest year round pot plants obtainable. The leaves are broader and more strap-shaped, of a very restful shade of bluish green, and it flowers for me as often as *T. violacea.* I have heard reports that *T. frag-*

Fig. 208. *Hymenocallis calathina* growing in apple box in California. Photo by Edith B. Strout, California.

rans flowered only in the spring, or at best, only twice a year. If one considers only one individual plant, perhaps this is true, but the "mother" plant splits into two plants of equal size just after flowering, and each of these divisions will flower in anywhere from two to three months. For instance, the pot I now have contained one plant in 1946, bloomed in September of that year, and split into two plants. One of

these was in bud in January of 1947, but a hard freeze froze the bud and so damaged the plant that it died. The other division, which had not budded, survived; and bloomed in the spring of 1947, dividing also into two plants. One of these divisions bloomed in August, the other in September, of 1947 and the last division made in September is in bud now, November 12, 1947 as well as the other divisions made in September. Thus the plant not only divides rapidly, but also blooms several times a year. And best of all, the umbels last a surprisingly long time, giving out their hyacinth-like fragrance so sweetly, but not as strongly as true hyacinths, that it seems a shame to leave such fragrance outside—I want it near me all day. I have mine potted in a 8″ pot—rather large for a house plant and it looked large for the one division I first planted in it, but considering how the plants divide, the pot will soon be full and will then make a larger showing.

T. fragrans needs *lots* of water. The first one I got, a seedling kindly given me by Mr. Perry Coppens, I thought so precious I coddled it and was determined not to lose it by over-watering (I had just lost several rare items through over-watering). The poor seedling tried its best but just wasn't making the grade. I decided it was dying, so I might try flooding it to see if that would suit it better. And to my utter surprise, it not only survived but grew rapidly to flowering size. Since then I have tried never to let the pots dry out. This last summer I have been too busy to care for the plants properly, so *T. fragrans* has dried out many times and seems to be standing it, but it certainly does better with ample moisture. Anything that grows so rapidly and profusely, of course, must be well fertilized too.

Vallota purpurea has been one of my failures, though usually listed as a bulb easy to grow in pots. I have not had a flowering size bulb, but have had several offsets given me. One rotted, one became the victim of the narcissus fly grugs, and the third also appears to have fly grubs in it. But I shall keep on trying this one.

There are many species of *Zephyranthes* and *Habranthus*, and all will grow in pots or containers; some are very adaptable while others seem very fussy about what they want. *Habranthus texanus* was the first I ever tried, and this did much better in pots than in the heavy clay soil for I could water the pots more thoroughly to induce bloom. One winter Mr. Houdyshel sent me a bulb to see if it could be transplanted and shipped during its active growing season. I potted in a 4″ pot and it not only grew but flowered well. For the past four years I've grown these, the larger *Habranthus Andersonii*, and *Zephyranthes grandiflora* (syn.—*carinata)* in a fruit lug and they have thrived and bloomed very well, besides self seeding.

Yes, even the *Z. grandiflora* have self-seeded; for among the various bulbs I have received under this name from different friends, I have found no difference that I could tell in the flowers, but some will seed while other clones appear not to. Though these may be different species and should be called by different names, the difference between them, if any, is so slight I call them all *Z. grandiflora*.

Habranthus robustus took me four years to bloom but the failure, I am now sure, was due to insufficient moisture. These grew and multiplied in the pots or cans, with either acid or neutral soil, but did not bloom until one time when I accidentally flooded the pot for some three days, and soon after a bloom appeared!

I have found in general that all the zephyranthes, cooperias, and some of the habranthus, need much more water than any other plants I have. For example, I had recently repotted some *Z. insularum,* and when we got an early fall rain which lasted for three days, I noticed the pot was full of water to the brim and I was greatly concerned for fear I had not provided sufficient drainage in the pot. For three days these were flooded like this, but when the rains let up, up popped fourteen bloom all at once from the bulbs in that 6″ bulb pan! Many other bulbs would have rotted under similar conditions.

A little *Zephyranthes* sent me from Mexico and called just a "deep pink" has bloomed oftener for me than any other this past summer. I have three bulbs in a small No. 2 can and there were very few times this summer when there wasn't at least one flower in bloom in that can. This flower was really a very deep rose color, about 2″ across, with petals some ¾″ wide, narrower and more rounded at tips than *Z. grandiflora,* with the base of the petals fading to white and then pale green, and with stigma much taller than the stamens. I hope I will be able to get this charming bulb identified.

Cooperias have done better for me in cans, whether planted one to a can or several, for the cans hold the moisture better and do not dry out as fast as pots. *Zephyranthes candida* also does very well in cans, though it multiplies so rapidly it should be separated every year or it will get too crowded. These usually bloom in September but once in a while, if given sufficient moisture, will bloom in spring.

Zephyranthes citrina is one of the *Zephyranthes* which likes a lot of depth for its roots, and will not do well for me in small or shallow cans. In free soil, I understand this bulb becomes a weed in many places, but I tried it for five years, trying both acid soil and lime soil, flooding and drying out, but no bloom until I planted it in a lime soil in a deep can so the roots could have more room, and then it bloomed.

Pyrolirion flava most definitely wants plenty of root room to be happy. The first few lots I had of these bulbs, planted in 6″ pots, were complete failures with me, but now I get bloom from them. I plant them in at least a gallon can, or one even deeper, in a sandy soil which is only slightly on the acid side. For me they seem to need a lot of water when growing and blooming, but want to be absolutely dry in the winter season when they are dormant. This is the reverse of our rainy season here, so the bulbs must either be dug in the fall and kept bare-rooted and dry, or the whole pot or can put where it will receive no moisture during the winter. But the large deep yellow flowers, looking like two three-petaled cups nested together, are worth every effort to grow and I consider it the finest of any of this group I have flowered. A 8″ or 10″ pot would probably provide sufficient root depth for these, but I prefer the straight sided

gallon cans. It does not seem to matter how sparsely or how closely these are planted as long as there is plenty of depth under the bulbs, and I believe the depth under them is the most important factor. Sometimes I've planted the bulbs nearly touching each other, but have about 1½″ of soil over them and at least 5 inches of soil under them.

A bicolor variety of *Zephyranthes macrosiphon* bloomed well for one season and then joined the growing list of departed rare bulbs. Another group received last summer through the kindness and courtesy of Mr. George Hamor, of Barahona, D. R. are growing well and I hope will bloom next season. These apparently need a lime soil, and seem happy in a 6″ pot or can of comparable size.

Another lime lover is *Zephyranthes bifolia,* which unfortunately I have been unable to flower. Mr. Hamor kindly sent me some seeds in 1944 which germinated well. Having several pots of them, I gave to various friends, and transplanted a few for myself into new pots when the tiny seedlings appeared crowded. I lost all of these seedlings except one pot I did not disturb. This one 4″ pot has stayed outside summer and winter, and I have kept the seedlings evergreen. When the pot was accidentally broken last year I transplanted, and found the seedlings were between ½″ and ¾″ in diameter. One lot of flowering sized bulbs Mr. Hamor sent me fell victim to the narcissus fly; a second shipment received this last summer has grown but does not seem happy. These last bulbs were budded upon arrival, but in spite of all the care I could give them, the buds did not develop. But I think the poor showing has been due to my handling rather than any dislike for the pots, and more seasons will be needed to find their preferences.

A *Zephyranthes* collected in the Philippines which came my way appeared to be very similar to *Z. insularum* but set seeds here while *insularum* does not seed for me. This one and one just recently received from Okinawa I have had too short a time to report on thoroughly.

A *Habranthus* species and *Amaryllis pratensis* were received just last summer from New Zealand and though they started to grow in summer, and the *Habranthus* species has multiplied, neither has flowered and I do not know yet what they will do or how they will like the pots.

Habranthus brachyandrus, sometimes recommended for pot culture, has been a complete failure for me. I have had this in a 4″ pot for some three or four years, and though there has been some increase, and the bulb appears thrifty, yet I have never had a bloom. Lack of space has prevented me trying it in a larger container, but I strongly suspect it is one of those bulbs wanting root room and therefore a deeper container.

This brings me to that group of bulbs which have usually been considered as unsuitable for pot culture.

Amaryllis advena leads this list, and is, incidentally, one of my favorites. When I tried growing this in a 6″ pot, it grew well but did not flower. A shortage of pots in this district during the war, forced me to put all the hardy (for this climate) bulbs in boxes to be grown outside. *Amaryllis advena* was one of these, going into half an orange crate. Here it has thrived and bloomed ever since, planted about 3″ deep, but

Crinum Moorei c. Frank Leach, with two flower scapes, and growing in a pail. Photo by Edith B. Strout.

Plate 329

with plenty of soil under it. The box is about 10″ in all dimensions, and contained in this box are about 12 bulbs, all from one deep oxblood red and one "pink" *A. advena* mother bulbs, about 30 seedlings which should be large enough to flower next year; 2 dozen Brodiaea Lilies (seed planted in box and now flowering size). 6 *Lycoris radiata,* and 2 *Leucocoryne ordorata.* In spring the *brodiaeas* and *Leucocoryne ordorata* are in bloom, and in fall the *Lycoris radiata* and *Amaryllis advena* put on their show, fortunately at different times so the colors do not clash. The box is now quite full, but all the bulbs are thrifty and very happy for it is the *depth* of the soil in the box that seems to count, and not crowding, for the two mother bulbs of *A. advena* flowered just as well when they were the only ones in the box.

From this I am wondering why some of the gardeners in more northern climates do not try the *Amaryllis advena* in *deep* flower boxes. I should think the bulbs could be planted in early August in the boxes, either alone or with other bulbs or annuals. Since they will stand considerable cold, growing them right against the house would afford some protection and they would get some warmth from the walls. In summer, they would have to be taken up or left dry, for my experience has been that they are very fussy about wanting to be kept bone dry in summer. They need full sun and bloom in August or September. Their very graceful flowers are well worth the efforts to grow and their cut blooms would add much to flower arrangements.

Brunsvigea rosea (Lamarck) Hann., called Cape Belladonna or Naked Lilies out here, has been tried by Eastern gardeners many times, but usually without success. Out here they are normally planted in the garden and forgotten until their spicy pink bells make a real showing in the fall. Since 1943 I have grown all of mine in containers and have had bloom every year. The variety usually called *Brunsvigia rosea* var. *major* is in a nail keg, five nice flowering sized bulbs (and these bulbs are normally very large). This bulb (one to start with, now five) has never missed a single season for bloom, and is quite happy in the container. The soil has never been changed, and I must admit, I've forgotten to fertilize. A variety I have which is a brilliant deep rose with a white throat, and which turns to a solid magenta as it ages, has also been happy in a nail keg, as well as the white *Brunsvigia rosea* var. *multiflora alba* (Plate 209). *Brunsvigia rosea* var. *minor* (Plate 210) is planted in a tin pail with soil only 7½″ deep, and another bicolor having a very deep rose edge and white throat does well in a can 9½″ deep. These did not bloom for a couple years after being planted in the smaller cans, but have bloomed the past two years. Those in the nail kegs always bloom, if given sufficient sun. With all of these containers the sides are either straight or else, as with the nail kegs, taper very little, so there is plenty of root *below* the bulb, and this is what I think is most important with this class of bulbs. I see no reason why these varieties of *Brunsvigia rosea* could not be grown in a 10″ or 12″ pot, for this would have more soil than the pails in which I have the *var. minor* planted. If given their other cultural requirements, of wet winters when they do their growing,

and absolutely dry in summer yet having the hot sun to bake them out, they should do well, particularly in the arid sections of the mid-west. And they are definitely worth trying to grow, with their fine pink or rose color and especially their spicy fragrance. Even the lovely white ones are richly fragrant.

Fig. 269. *Brunsvigia rosea* var. *multiflora alba* growing in a nail pail in California. Photo by Edith B. Strout, California.

Very similar in culture to the varieties of *Brunsvigia rosea* is *Lycoris radiata,* which grows so well out of doors in the southern states. This bulb makes its growth during the cool winter months, is dormant in the dry summers, and flowers before the leaves appear in the fall. Usually they will flower the first year in pots, but not in succeeding years. The

first one I tried in a 6″ bulb pan, and when it was not thriving I knocked it out, to find the roots had enlarged to about ¾″ in diameter, were clear, transparent and looked more like tubers than roots. I have never seen the roots of this bulb looking this way when given sufficient root room. I suppose they are trying to store up food and moisture. After planting in one of the half orange crates, where it had more depth, it has thrived along with the *Amaryllis advena.* The box is very crowded with other bulbs but it is the depth of the soil under the bulb which seems to count most.

Lycoris incarnata was planted in a small 4″ pot and the first season fell victim to the narcissus fly, so I do not know how it would otherwise behave. *Lycoris squamigera,* planted in a pail, did not thrive the first year and then it too, fell victim to "the fly." Circumstances have prevented me trying these again.

Lycoris aurea grows well in the half orange crates. I believe this bulb would do well in smaller pots, but I have not tried it in the smaller containers. The fly seems to like these very well too, and I've lost several, but others seem happy in the boxes. These should have some moisture during the summer and will suffer if left completely dry like *L. radiata.* They also seem to want a sandier soil. Their beautiful yellow umbels in the fall are well worth striving for and I rate it among my choicest bulbs.

Many people grow crinums in pots or containers, but being large bulbs they seem to need unusually large pots. The most successful one I have grown is *Crinum Moorei* c. Frank Leach (Plate 329)—the large plant occasionally seen around here. This I have planted in a 10″ diameter pail, 10 quart capacity, which seems very inadequate when the three foot high plant and a couple of four foot flower stalks are in bloom! This bulb has been here for four years, has made nine or ten offsets, about three of which have been removed. Generally, with me at least, all the crinums resent moving and I've never had one bloom the first year after transplanting or after getting it though I know several people who dig the crinums each fall and replant in spring and get flowers regularly. *Crinum Moorei* c.Frank Leach and another variety of *Crinum Moorei* that I raised from a tiny offset, are the only ones I've flowered. The hybrid crinums, Cecil Houdyshel and Ellen Bosanquet, and *C.bulbispermum* were all received as offsets and some are now large enough to bloom. *C. Kirkii* and two other unknown ones were flowering size bulbs but did not bloom the first season after planting, and I will have to wait till next year to see what they do.

Calostemma purpureum is a very lovely Australian amaryllid that I hope will be planted more generally. To me, it looks like a miniature deep rosy purple daffodil with the perianth not quite opened, but the yellow lip of the cup trying its best to get your attention. Unfortunately I've only gotten it to bloom twice, but this was due to adverse conditions. The first season it bloomed, "the fly" got into it, so I took drastic measures. Although warned that paradichlorobenzene crystals would kill bulbs if placed near them when the soil was damp, I put the crystals directly on the cut portion of the flower stem, in the heart of the leaves and

all around the bulb, for I did so want to save the bulb. I was successful—all the fly grubs were killed, the bulbs lived, but I lost the flowers for a couple of years. Now the plant is in bloom again, and with all appearances of another attack of fly grubs! So I suspect it is quite attractive to the fly and precautions should be taken to safeguard it against attack. I have two bulbs and two offsets growing in a 5″ pot. They have been in the pot, with no change of soil, for four years. For me, this bulb seems to prefer to be kept evergreen but I'm not sure that others would find this desirable.

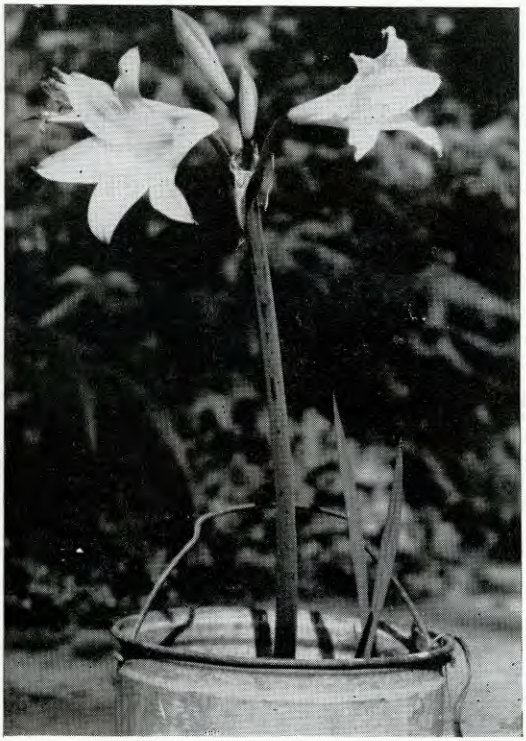

Fig. 210. *Brunsvigia rosea* var. *minor* growing in a small pail in California. Photo by Edith B. Strout.

Incidentally, from my own sad experience, paradichlorobenzene crystals is the only thing that I know of that will kill the narcissus fly grubs and save the bulbs, if caught in time. I have put the crystals directly in the leaf axils of *Amaryllis* and other plants, and though it will, of course, burn the leaves it touches so severely that they will die, the bulbs survive and soon regain their original vigor with the exception of *Amaryllis belladonna* Linn. (syn.—*Hippeastrum equestre)* and some of

its hybrids that have a lot of *A. belladonna* characteristics. The crystals seem to kill these bulbs, for they never recover. On the other hand, the crystals were used on two of the *Haemanthus* from Saba Island, both badly infested with grubs. In one, the grubs were all around the base of the bulb and were eating in from the outside—in the other the center of the bulb had been eaten quite badly. Crystals were put directly in the center cavity of this one, and around the other bulb, and both bulbs flowered the following year! When the lesser narcissus fly is in the neighborhood, constant vigilance is needed for just one bulb overlooked can produce a lot of flies to lay more eggs in my own yard, and all the flies from the neighbors yards must be fought. Since the narcissus fly seems to be well established in this neighborhood, I have a constant fight on my hands and have lost many prize bulbs to it in spite of my efforts.

Milla biflora and *Bessera elegans* were grown in the shallow fruit lugs, and bloomed well the first year I had them, but have not bloomed since. This may be some cultural fault of mine, however, and I'd want further trials before saying they could, or could not, be grown will in boxes or pots.

From reading various accounts, I always thought *Alstromeria* was too tall a plant to grow in pots, and I never tried it, until some seedlings of a purple-rose variety came my way in a pot of *Amaryllis*. I transplanted the seedlings to an apple box, among the tulips and hyacinths, and let it grow. For several years, though the plant had grown to a nice size, I had no flowers, for I had been watering all summer. But this year I let it stay dry during the summer but watered in fall, and had a very nice group of flower stems. Recently in moving the plants to a new home we are building, I found a large clump of nice tubers, with the roots reaching all the way to the bottom of the apple box. Others have no doubt had much more experience with these plants in pots than I, but I see no reason why they could not be grown in containers.

Naturally, I've had some complete failures. Among these has been *Sprekelia formossima*. I've tried the usual type, as well as *var. superba*. I've tried them evergreen, dried off in winter, in pots, and in boxes, and I've never gotten a flower in six years! The same is true of *Childanthus fragrans*. For the past two years I've had these planted in an apple box with the ismenes, but still never a bloom. Some I've left potted so the roots would not dry, some I've given some water in winter, and have generally tried them every way I could think of, but without results.

Stenomesson variegata I believe, has not bloomed for me. This bulb seemed to want to be evergreen, growing well in winter and even making offsets, but has never bloomed. Now, in an effort to get bloom, I am keeping it dry all winter to see what will happen and if it will bloom for me next spring. It is husky, has produced a number of offsets, but just does not bloom. The reason is probably in my culture, not in its resentment of the pot, but I will have to wait till I've gained more knowledge of it to decide. Some seedling *Stenomesson Pearcei* seem to be growing slowly, but growing none the less, but they are still too small to bloom.

The *Pancratium maritimum* I once had was never happy in the pot and departed this life before further trial could be made. *Polianthes*

tuberosa has not bloomed for me, though this last year in a fruit lug it made good growth. I think this is due to insufficient water during the summers, as well as other soil requirements not fulfilled to their liking. *Ixiolirion montanum* bloomed well the first year in a fruit lug, and bloomed the second year, but since then I have not seen it. This is a very worthy garden subject, in my opinion, and I want to try it again. I believe it resented more our warm winters which forced it into early growth, rather than the boxes, but further study will have to be made on that point.

One of my most amusing experiences with growing plants was furnished by some bulblets of *Furcraea gigantea* (placed in the *Agavaceae* by Hutchinson). A friend of mine had secured some of these and they had gotten mixed up with her bulbs of *Leucojum,* and she sent me three under the name of *Leucojum.* I was not very familiar with bulbs at that time and so planted them, but as soon as they started to grow, I knew they weren't leucojums. I had two in a pound coffee can, and one in another coffee can. They grew and grew. I discovered that they were very tender for a light freeze froze the larger bulb, but it made offsets before passing on. After my "leucojums" were identified, I knew I could not grow a plant with 8 foot leaves and a 25 foot flower stalk in a coffee can, so I passed on this plant to friends who could give it more room as well as a frost free location. It is one plant I definitely would not recommend growing in pots, but undoubtedly it *could* be done, if the container were *large* enough!

SOUTH AFRICAN AMARYLLIDS—COOMBS

[Continued from page 112.]

should take place just when the bulbs start to grow their roots after the drying time. The only treatment usually necessary is to dig out the top soil only, work off the offsets and fill the space with rich soil. The offsets may be planted about 4 to a 3 inch pot or singly in a 2 or 2½ inch pot and transferred to a larger pot when necessary. Water carefully after repotting. Do not overwater.

Seeds germinate quickly and should be planted as soon as ripe in shallow pans in good sandy soil. Do not cover seeds too deeply. Leave in pans till following autumn, then pot into small pots. The smaller seedlings should be saved carefully, if they are hybrids. Mealy bugs are the pest which like these bulbs best and should be watched out for.

Mr. Weston wrote of the ways of his nerines, some of which bloomed several times a year. *N. Bowdeni* bloomed in October, April, and ahead of normal times in one year and *N. filifolia (rosea-crispa)* blooming five times in a year. These bulbs ignored rules and regulations.

[The second installment of this article will appear in a later edition of HERBERTIA.]

COPIES OF VOLUME 1 (1934) WANTED

WANTED—TWO COPIES OF VOLUME 1. The Year Book of the AMERICAN AMARYLLIS SOCIETY (HERBERTIA), Volume 1 (1934) was dedicated to the late Henry H. Nehrling, the distinguished plantsman. Single copies of this issue are no longer available. We have recently received a request from Mr. Arno H. Nehrling, a son of the distinguished plantsman, and Director of Publications Massachusetts Horticultural Society, for two copies of Volume 1 (1934). It would be very much appreciated should those who can spare their copies of this volume communicate with the Asst.-Secy., Mr. E. Frederick Smith, Box 2398, Stanford, Calif., who will keep a record for such available copies. The condition of the copy and price wanted should also be indicated. In this way Mr. Arno Nehrling and any others wanting this volume can be supplied.

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

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Mr. J. Marion Shull, *Maryland*
Dr. Hamilton P. Traub, *Maryland*
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Mr. Wyndham Hayward, *Florida*
Mr. Donald B. Milliken, *California*
Prof. J. B. S. Norton, *Maryland*

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

Registration of Daylily Names—Registrars: Prof. J. B. S. Norton, *4922 40th Place, Hyattsville, Maryland,* and Mr. W. R. Ballard, *5102 41st Ave., Hyattsville, Maryland.*

[Correspondence about priority of Daylily names should be sent directly to Prof. Norton, *but a self-addressed, stamped envelope should be enclosed if a reply is expected.*]

Daylily Jury (For evaluating Daylilies)—Prof. L. H. MacDaniels, *Chairman, Cornell University, Ithaca, N. Y.*

Those in charge of Official Cooperating Trial Gardens are *ex-officio* members of the Daylily Jury.

OFFICIAL COOPERATIVE DAYLILY TRIAL GARDENS

Prof. John V. Watkins, in charge of Daylily Trial Garden, College of Agriculture, University of Florida, Gainesville, Fla.

Dr. Paul L. Sandahl, Supt., in charge of Daylily Trial Garden, Dept. of Parks & Public Property, City of Des Moines, Iowa.

Prof. Ira S. Nelson, in charge of Daylily Trial Garden, Dept. of Horticulture, Southwestern Louisiana Institute, Lafayette, La.

Prof. L. H. MacDaniels, in charge of Daylily Trial Garden, Dept. of Agriculture, Cornell University, Ithaca, N. Y.

Mr. H. T. Blackhurst, in charge of Daylily Trial Garden, Division of Horticulture, Texas, Agric. Expt. Station, College Station, Texas.

Mr. John E. Voight, RFD One, Box 76, Hales Corners, Wisc., in charge of Daylily Trial Garden, at The Botanical Gardens, Whitnall Park.

Mr. W. Quinn Buck, in charge of Daylily Trial Garden, Div. of Ornamental Horticulture, University of California at Los Angeles.

Note:—Introducers of new daylily clones should send plants directly to the Trial Gardens for testing. As soon as practical each trial garden will publish, in Herbertia, lists of the 10, 25, 50 and 100 best daylilies, on the basis of the clones tested, for the climatic region in which it is located.

DATA CARD FOR HEMEROCALLIS

When describing daylily clones, all breeders and growers are requested to use the Official Data Card for Hemerocallis, devised by the eminent artist and horticulturist, J. Marion Shull, and fully described in Herbertia, Vol. 7, 1940 and Vol. 14, 1947. These cards should not only be used in describing new clones but also for the description of all older clones grown in the various climatic regions.

These cards are available at present in the 3 inch by 5 inch size at the nominal price of $1.25 per hundred, to pay for printing, handling and postage. Make checks payable to the AMERICAN PLANT LIFE SOCIETY, and send orders to—

Mr. E. Frederick Smith, Asst. Sec'y.-Treas.,
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SCORE CARD FOR HEMEROCALLIS

For the official score card for Hemerocallis see HERBERTIA, Volume 7, page 126, 1940. Reprinted in Vol. 14 (1947), page 37.

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FLOWER TYPES AND SCORE CARD FOR HYBRID AMARYLLIS

For classification of flower types and score card for Hybrid Amaryllis see HERBERTIA, Volume 5, pages 141 to 145, 1938.

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II. PUBLICATIONS OF THE AMERICAN PLANT LIFE SOCIETY

(A) **PLANT LIFE,** the periodical devoted to the increase and diffusion of knowledge concerning plants.

Vol. 1 (No. 1). Symposium on *Narcissus* breeding by various authors. Vol. 1 (Nos. 2 & 3), First Bromeliaceae Edition. Profusely illustrated symposium on the bromels by Dr. Lyman B. Smith, Mulford B. and Racine Foster, David Barry, Jr., Ladislaus Cutak, and Wyndham Hayward. 105 pages.

Vol. 2 (Nos. 1—3). Verbenaceae Edition. Illustrated treatise on the *Verbena* Family by Dr. and Mrs. Moldenke, the outstanding authorities on this plant family. 100 pages.

Vol. 3 (Nos. 1—3). General Edition. Containing an illustrated article on winter and spring flowering *Gladiolus* by W. M. James, and articles on the Dutch Bulb Industry by Dr. A. J. Verhage and J. F. Ch. Dix. 42 pages.

Vol. 4 (Nos. 1—3). Aroid Lily Edition. An illustrated treatise primarily on the genus *Zantedeschia* (Aroid Lily) containing articles by Hamilton P. Traub, A. A. Longmire, Fred M. Danks, H. M. Butterfield, Wyndham Hayward and Len Mirzwick. 48 pages.

The prices indicated below supercede all quotations made prior to 1948.

Vol. 1 (1945), $2.50 postpaid
Vol. 2 (1946), $2.00 postpaid
Vol. 3 (1947), $1.00 postpaid
Vol. 4 (1948), $1.00 postpaid

Only a limited number of copies are available, and quotations are subject to prior sale.

(B) **HERBERTIA,** the year book devoted to the increase and diffusion of knowledge about the amaryllids (**Amaryllidaceae**), and the workers concerned in their advancement, past and present.

A complete file of Herbertia, the year book of Amaryllis Section of the American Plant Life Society, is indispensable to all research libraries and to all who are interested in Amaryllids.

Volume 1 (1934). Dedicated to Henry Nehrling. Containing the biography of Henry Nehrling, and many valuable articles on amaryllis; with a portrait of Henry Nehrling and 16 other illustrations; a total of 101 pages.

Volume 2 (1935). Dedicated to Theodore L. Mead. Containing the autobiography of Theodore L. Mead, and many excellent articles on varieties, breeding, propagation, and culture of amaryllids; with portraits of Theodore L. Mead and David Griffith and 18 other illustrations; a total of 151 pages.

Volume 3 (1936). Dedicated to Arthington Worsley. Containing the autobiography of Arlington Worsley, and important articles on

description, genetics and breeding, physiology of reproduction, and amaryllid culture; with 3 portraits of Arlington Worsley, one color plate, and 30 other illustrations; a total of 151 pages.

Volume 4 (1937). First British Edition. Dedicated to William Herbert. Containing the biography of William Herbert; the reprint of Herbert's essay, on Crosses and Hybrid Intermixtures in Vegetables; Dr. Darlington's essay, The Early Hybridizers and the Origins of Genetics, and many important articles on description; cytology, genetics and breeding; physiology of reproduction, and amaryllid culture; with two portraits, forty-four other plates and three figures; a total of 280 pages.

Volume 5 (1938). First Netherlands Edition. Dedicated to Ernst H. Krelage. Containing the autobiography of Ernst H. Krelage; the history of amaryllid culture in Holland by Ernst H. Krelage, Dr. Uphof's important article in which the name *Hippeastrum* is rejected; a revision of the tribes of the Amaryllidaceae; and the species of Amaryllis; outstanding articles on forcing amaryllids by Dr. Grainer and Prof. Dr. van Slogteren; and many other articles on description, cytology, genetics and breeding; physiology of reproduction, and amaryllid culture; with 33 plates and 2 figures; a total of 218 pages.

Volume 6 (1939). Dedicated to the Union of South Africa, and containing articles on South African amaryllids, including the history of botanical exploration for amaryllids in South Africa, the distribution of South African amaryllids in relation to rainfall, and a review of the genus *Agapanthus* by Frances M. Leighton, a review of the Genus *Cyrtanthus,* with many excellent line drawings, by Dr. R. A. Dyer; other articles—*Zephyranthes* of the West Indies by Dr. Hume; the Tribe *Gilliesieae* by Dr. Hutchinson; rating of daylilies for garden value by Mr. Kelso; daffodil articles by Jan de Graaff, and many other items on description, cytology, breeding, propagation, and amaryllid culture; with 44 plates and 10 figures; a total of 258 pages.

Volume 7 (1940). Dedicated to Latin America, and featuring articles on Latin American amaryllids; biographies of Drs. Philippi and Holmberg; report by Dr. Goodspeed on the amaryllids collected by the Univ. of Calif., Second Andean Expedition; reports on the flowering of the "Blue Amaryllis," *A. procera;* and many other important articles on the description, propagation, breeding, culture, harvesting and storage of amaryllids. Of special interest are the important articles on the description, breeding and culture of daylilies by noted authorities. With 45 illustrations—30 plates and 15 figures—and a total of 242 pages.

Volume 8 (1941). First Daylily Edition. The first extensive symposium on the daylily, containing biographies of George Yeld, Amos Perry, Hans Sass, and Paul Cook, and important articles on daylily evaluation, breeding, propagation and culture. Also important articles on *Narcissus* and other amaryllids. Thirty-eight illustrations—27 plates and 11 figures—and a total of 185 pages.

Volume 9 (1942). First Alstroemerid Edition. Dedicated to Harry L. Stinson, the outstanding authority on this plant group, who contributes a summary of his work on Alstroemerid taxonomy, breeding, propagation and culture. This volume contains the autobiography of

Prof. Dr. Abilio Fernandes, the Check-List of Amaryllids by Major Pam, and a review of the species of *Crinum* by Dr. Uphof, and also many important articles on daylilies, *Narcissus, Cyrtanthus,* hybrid *Amaryllis, Ixiolirion* and other amaryllids. Thirty-five illustrations—17 plates and 18 figures—and a total of 243 pages.

Volume 10 (1943). 10TH ANNIVERSARY EDITION. Dedicated to Elizabeth Lawrence, the outstanding authority on the use of amaryllids in the garden, who contributes a summary of her work in this field. This volume contains the review of *Agapanthus* and *Tulbaghia,* by Dr. Uphof; an article on *Brunsvigia rosea* and hybrids by Mr. Hannibal; a symposium on *Narcissus* breeding by Messrs. Powell, Reinelt, Berry and Reynolds; a review of amaryllid chromosomes by Dr. Flory; articles on hybrid amaryllis, daylilies, and many other important articles on amaryllids. Forty-one illustrations—12 plates and 29 text figures—and a total of 205 pages.

Volume 11 (1944). FIRST ALLIEAE EDITION. Dedicated to Dr. Henry A. Jones, the eminent American authority on the onion. This is one of the most outstanding issues up to the present for its record making contributions on the systematics of *Allium* by British authorities, and on onion breeding, propagation, and culture by American authorities. It contains Mr. Airy Shaw's translation of Vvedensky's Alliums of the Soviet Union; Stearn's essay on the onion in the Old World and other articles; and articles on onion breeding, propagation and culture by Dr. Jones and his colleagues. There are also important contributions on ornamental Alliums for North America, and Allieae of North America. There are excellent articles on hybrid *Amaryllis,* Daylilies and various other amaryllids. Forty-three illustrations—25 plates and 18 text figures —and a total of 369 pages.

Volume 12 (1945). FIRST EDUCATIONAL EDITION. Dedicated to Supt. R. C. Huey, a pioneer in the use of amaryllids as an educational tool. This volume contains a brief autobiography by Supt. Huey, and an article by him on the use of amaryllids in teaching plant science; the announcement by Mulford B. Foster of the reintroduction of the sweet-scented *Alstroemeria caryophyllaea,* and an article by Harry L. Stinson on the true *Alstroemeria Ligtu.* This issue also contains an article on the origin of *Tapeinanthus humilis* by A. & R. Fernandes; important articles on *Narcissus* breeding; *Leucocoryne* and related genera; articles on various other amaryllids, including valuable contributions on *Hemerocallis* description and appreciation, breeding, culture, and packing daylily plants for shipping. Twenty-four illustrations—15 plates and 10 text figures—a total of 180 pages.

Volume 13 (1946). FIRST NARCISSUS EDITION. Dedicated to Guy L. Wilson, the noted *Narcissus* breeder. This volume contains an autobiography of Mr. Wilson, an article on his breeding activities; an article on *Narcissus* breeding in Australia by Mr. Alston; articles by American *Narcissus* breeders, including Frank Reinelt, E. P. Powell, J. S. Cooley, C. W. Culpepper and W. R. Ballard; an article on the karyology of the subgenus *Ajax* of the genus *Narcissus* by A. and R. Fernandes; a list

of parents of hybrid *Narcissus* by Arno H. Bowers; *Narcissus* diseases by C. J. Gould; *Narcissus* insects and mites by E. P. Breakey; *Narcissus* culture by various authors. There are also articles on other amaryllids—*Hemerocallis,* hybrid *Amaryllis, Habranthus, Crinums, Lapagerias, Agapanthus, Hymenocallis,* etc. Thirty-nine illustrations—186 pages.

Volume 14 (1947). 2ND HEMEROCALLIS EDITION. Dedicated to Ralph W. Wheeler, the noted Daylily breeder. This volume contains an autobiography of Mr. Wheeler and an article on his breeding activities; and many important articles on *Hemerocallis* description, evaluation, breeding, etc., from various parts of the country. There are also important articles on other amaryllids—Hybrid *Amaryllis,* amaryllids in the Holy Land and Mexico, starch in *Alstroemeria,* the *Galantheae,* Double *Narcissus, Zephyranthes, Sternbergia, Allum,* etc. Twenty-eight illustrations—206 pages.

Volume 15 (1948). 2ND SOUTH AFRICAN EDITION. Dedicated to Dr. R. A. Dyer. This volume contains an autobiography of Dr. Dyer and two amaryllid articles by him, and other articles on South African amaryllids. There are also important articles on *Hemerocallis Amaryllis, Crinum, Narcissus,* BRODIAEA LILIES, Alstroemerias and other amaryllids by various authors. Forty-one illustrations—177 pages.

The prices of back issues of HERBERTIA indicated below supercede all quotations made prior to the date of publication of the present issue.

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(C) **OTHER PUBLICATIONS**—devoted to the increase and diffusion of knowledge concerning plants, and the workers concerned in their advancement, past and present.

AMARYLLIDACEAE: TRIBE AMARYLLEAE, by Hamilton P. Traub and Harold N. Moldenke. The American Plant Life Society, Box 2398, Stanford, Calif. 1949. Manila covers; 18 illustrations; 194 pages. $4.00.

This is a systematic treatment of one of the main tribes of the *Amaryllis* Family (Amaryllidaceae), including the seven genera *Lepidopharynx, Worsleya, Amaryllis Linn., Placea, Griffinia, Ungernia* and *Lycoris.* Detailed descriptions of the species are included. For a more detailed notice on this book the reader is referred to the abstract published in this issue of HERBERTIA.

DESCRIPTIVE CATALOG OF HEMEROCALLIS CLONES, 1892—1948, by J. B. S. Norton, M. Frederick Stuntz, and W. R. Ballard. First Edition. The American Plant Life Society, Box 2398, Stanford, Calif., 1949. Manila covers; 1 illustration; 100 pages. $1.50.

This is sponsored jointly by the AMERICAN PLANT LIFE SOCIETY and the HEMEROCALLIS SOCIETY and consists of an introductory section concerned with the naming and description of *Hemerocallis* clones, and an alphabetical list of *Hemerocallis* clones with very brief descriptions as far as known.

Make checks payable to the AMERICAN PLANT LIFE SOCIETY, and send orders to—

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VOLUMES 11-15

1944—1948, incl.

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HAROLD N. MOLDENKE

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Illustrations, volumes 11--15 (1944—1948, incl.)

Plates nos. 254 to 329
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CORRIGENDA, HERBERTIA, VOLS. 11—15 (1944—1948, incl.)

Corrigenda for HERBERTIA, vol. 11 (1944) 1945 appear on page 7 and pages 167—174, HERBERTIA, vol. 12 (1945) 1947;

Corrigenda for HERBERTIA, vol. 12 (1945) 1947 appear on page 4, HERBERTIA, vol. 13 (1946) 1948;

Corrigenda for HERBERTIA, vol. 13 (1946) 1948) appear on page 9, HERBERTIA, vol. 15 (1948);

Corrigenda for HERBERTIA, vol. 14 (1947) 1948 appear on page 8, HERBERTIA, vol. 15 (1948); and

Corrigenda for HERBERTIA, vol. 15 (1948) will appear in the HERBERTIA issue of PLANT LIFE, vol. 5 (1949).

NEW SERIES OF HERBERTIA

Volumes 1 to 15, inclusive, constitute the first series of HERBERTIA, and it should be noted that beginning with vol. 5, of PLANT LIFE, the annual year book devoted exclusively to the Amaryllids, HERBERTIA, will be published in a new series, but in the same format as heretofore, entitled HERBERTIA and devoted exclusively to the amaryllids, as heretofore, and will thus remain unchanged in all respects except that for reasons of convenience in handling publication details, it will appear as one of the annual numbers of PLANT LIFE.

As soon as possible, a complete INDEX VOLUME to vols. 1—15, incl., of the first series of HERBERTIA, will be issued. When this is ready for publication announcement will be made so that those interested may purchase copies.

[Note.—This leaf, page iii, is to be bound with the front title page, etc., for Vols. 6—10, incl., that were included at the end of **Herbertia,** vol. 10.]

CORRIGENDA HERBERTIA, VOL. 10, 1943

Cover; due to an error by the engraver, some copies of Vol. 10 were sent out with "1944" on cover; on these "1944" should be changed to "1943."

Page 49; species no. 17, for "Gray" read "Grey, Hardy Bulbs."

Page 52; 15th. line from bottom, for "family" read "finally."

Page 53; 7th. line from top, for "1853" read "1753."

Page 54; 2nd. line from top, for "distichously or spirally" read "not biflabellately."

Pages 83, 87, and 88; Fig. 94, and Plates 245 and 246, for "*gen. nov.*" read "*comb. nov.*"

Page 96, Fig. 96, for "*ovallaris*" read "*obvallaris.*"

Page 101, 3rd. line from bottom, for "*Beckhouse*" read "*Backhouse.*"

Page 116, 16th. line from top, for "*Lyconis*" read "*Lycoris.*"
17th. line from top, for "*Stenbergia*" read "*Sternbergia.*"

Page 118, 16th. line from top, for "*volubil*" read "*volubile.*"

Page 131, title at top. after "DICHOGAMY AND INTERSPECIFIC STERILITY" add "IN ALSTROEMERIA."

Page 194, 9th. line from bottom, for "Cpl." read "Sgt."

Page 195, 22nd line from bottom, for "Uphoff" read "Uphof."

Page 196, 29th. line from top, for "thirty-eight" read "forty-one"; for "18" read "12"; and for "20" read "29."
30th. line from top, for "225" read "205."