

THE AMERICAN
Horticultural
MAGAZINE



JOURNAL OF THE AMERICAN HORTICULTURAL SOCIETY, INC. *January 1960

AMERICAN HORTICULTURAL SOCIETY

*A union of the American Horticultural Society
and the American Horticultural Council*

1600 BLADENSBURG ROAD, NORTHEAST • WASHINGTON 2, D. C.



For United Horticulture

★★★ *to accumulate, increase, and disseminate horticultural information*

B. Y. MORRISON, *Editor*

JAMES R. HARLOW, *Managing Editor*

Editorial Committee

W. H. HODGE, *Chairman*

JOHN L. CREECH

FREDERIC P. LEE

CONRAD B. LINK

CURTIS MAY

FREDERICK G. MEYER

WILBUR H. YOUNGMAN

Officers

PRESIDENT

RICHARD P. WHITE
Washington, D. C.

FIRST VICE-PRESIDENT

DONALD WYMAN
Jamaica Plain, Massachusetts

SECOND VICE-PRESIDENT

STUART M. ARMSTRONG
Silver Spring, Maryland

SECRETARY-TREASURER

OLIVE E. WEATHERELL
Washington, D. C.

Directors

Terms Expiring 1960

DONOVAN S. CORRELL

Texas

CARL W. FENNINGER

Pennsylvania

W. H. HODGE

Pennsylvania

A. J. IRVING

New York

WILLIAM C. STEERE

New York

Terms Expiring 1961

STUART M. ARMSTRONG

Maryland

JOHN L. CREECH

Maryland

WILLIAM H. FREDERICK, JR.

Delaware

FRANCIS PATTESON-KNIGHT

Virginia

DONALD WYMAN

Massachusetts

Terms Expiring 1962

FREDERIC P. LEE

Maryland

HENRY T. SKINNER

District of Columbia

GEORGE H. SPALDING

California

RICHARD P. WHITE

District of Columbia

ANNE WERTSNER WOOD

Pennsylvania

The American Horticultural Magazine is the official publication of the American Horticultural Society and is issued four times a year during the quarters commencing with January, April, July and October. It is devoted to the dissemination of knowledge in the science and art of growing ornamental plants, fruits, vegetables, and related subjects.

Original papers increasing the historical, varietal, and cultural knowledges of plant materials of economic and aesthetic importance are welcomed and will be published as early as possible. The Chairman of the Editorial Committee should be consulted for manuscript specifications.

Reprints, saddle-stapled, will be furnished in accordance with the following schedule of prices, plus postage, and should be ordered at the time the galley proof is returned by the author: One hundred copies—2 pp \$6.60; 4 pp \$12.10; 8 pp \$25.30; 12 pp \$36.30; Covers \$12.10.

Entered as second class matter in the post office at Baltimore, Maryland, in accordance with the Act of August 24, 1912. Additional entry for Washington, D.C., was authorized July 15, 1955, in accordance with the provisions of Section 132.122, Postal Manual. A subscription to *The American Horticultural Magazine* is included as a benefit of membership in the American Horticultural Society, Individual Membership dues being \$6.00 a year.

THE AMERICAN *Horticultural* MAGAZINE

FORMERLY THE NATIONAL HORTICULTURAL MAGAZINE VOLUME 39 • NUMBER 1

Contents

The Fairchild Tropical Garden NIXON SMILEY	1
Blueberry Breeding: Past, Present, Future GEORGE M. DARROW	14
The Calabash Trees EDWIN A. MENNINGER	34
Lenten Roses in the Southeast BROOKS E. WIGGINTON	41
A Book or Two	44
The Gardeners' Pocketbook	
Ornamental Species of <i>Mucuna</i>	50
Notes on Two Heath Plants	53
<i>Tulbaghia violacea</i>	54
Our Native False Aloe	54
<i>Byblis gigantea</i>	55
<i>Leucojum vernal</i> and <i>L. aestivum</i> Gravetye Giant	58
<i>Camellia granthamiana</i> : Another rare gift from China	58

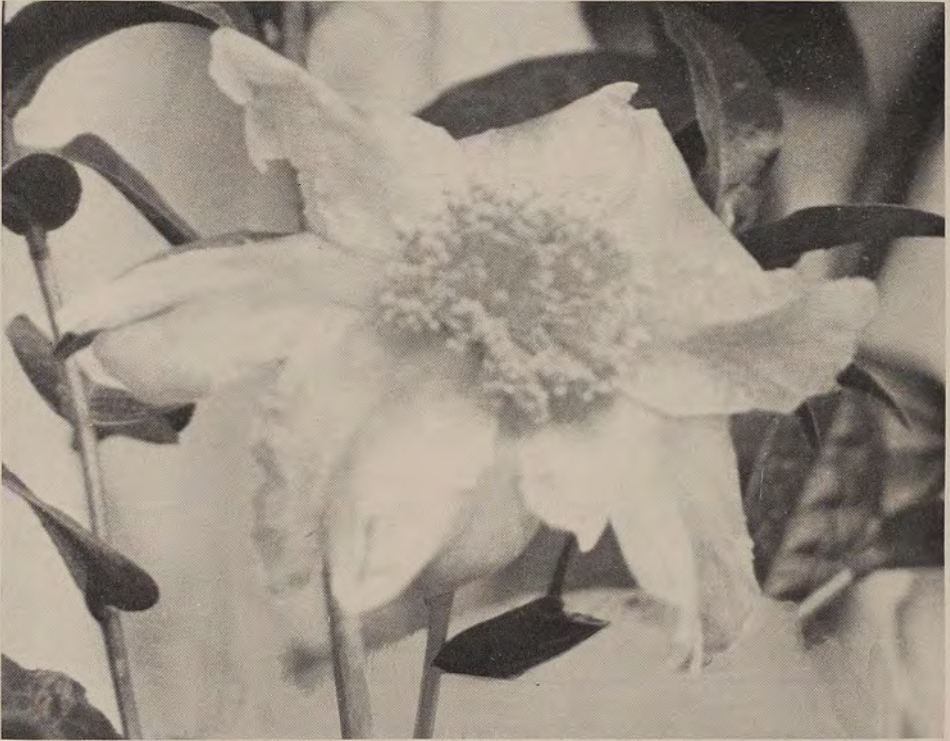


JANUARY COVER ILLUSTRATION

(G. HAMPFLE)

Byblis gigantea . . . rare, native carnivorous plant of Australia . . . flowered under cultivation at Longwood Gardens, Kennett Square, Pennsylvania . . . believed to be the first time it has flowered in the United States. . . details on page 55

Copyright 1960 by The American Horticultural Society, Inc.



CLIFTON GUTHRIE

See Page 58 for an account of a new species —

Camellia granthamiana

American Horticultural Society

1600 Bladensburg Road, Northeast, Washington 2, D. C.

Dear Member:

We begin the New Year of 1960 by making several announcements which I am confident will increase the benefits you receive from your membership in the American Horticultural Society.

First—we announce a union of the American Horticultural Society and the American Horticultural Council.

The name of this united organization is the
American Horticultural Society.

New officers and directors have been elected, and their names appear on the inside front cover of this issue of the magazine.

The name of your magazine has been changed from The National Horticultural Magazine to *The American Horticultural Magazine*. This seems to be a name which is better coordinated with the name of our Society. (The name The National Horticultural Magazine was assumed back in 1926—when the National Horticultural Society and the American Horticultural Society joined forces to carry on as the American Horticultural Society.)

New articles of incorporation and new by-laws have been determined and they will be detailed for you in an early issue of the *American Horticultural Society Gardeners Forum*.

You will become aware, during the months and years to come, of increasing services which this stronger, broader organization will provide each member. And, you will see evidences of the greater contributions this Society is able to make toward *a united horticulture*.

With all best wishes,

Richard P. White, *President*



NIXON SMILEY

The Fairchild Tropical Garden's Man-Made Jungle

was created by massing palms and allowing Aroid species to climb upon them. The flowering palm (left) is an undetermined species of Caryota; Scindapsus aureus, the common pothos, is the large-leaved vine.



Congea tomentosa, shown here in flower, is one of over a hundred species in the tropical vine collection.

The Fairchild Tropical Garden

NIXON SMILEY*

To most of the world Miami is a dazzling vacation land, with the beaches lined with swank hotels, where the rich come to play and where the residents live by soaking the free-spending visitors. For one who has never lived in South Florida, or who has not stayed here for any length of time, it may be difficult to realize that the Miami area does have a serious side.

If Miami did not have a serious side, how would it be possible to explain the strong interest in music and the theater? How would it be possible to explain the

progress of the University of Miami which is barely thirty years old? How would it be possible to explain the area's attraction for thousands of retiring people? How would it be possible to explain the Fairchild Tropical Garden?

Fun seeking vacationers are not likely to give much support to a botanical garden. Yet, although the Fairchild Tropical Garden is only a little over twenty years old, it is the largest tropical botanical garden in the United States, possessing valuable plant collections that are being increased all the time; a garden which has gained enough reputation to put it in a class with the better known botanical gardens.

*Nixon Smiley has served since 1956 as Director of the Fairchild Tropical Garden. He is also the Farm and Garden Editor of the *Miami Herald* through whose courtesy all photographs have been supplied.

A garden doesn't just happen. Such things begin in the mind of one person. The Fairchild Tropical Garden did. The mind was that of the late Robert H. Montgomery, a New York tax attorney and accountant. He lived at Cos Cob, Connecticut, but came to Florida in the early 1930's to build a winter home and to develop a private plant collection.

At Cos Cob, Colonel Montgomery had spent many years in building a valuable collection of conifers. A friend, George P. Brett, head of The Macmillan Company, urged Colonel Montgomery to buy a site in Dade County, south of Miami [near where Mr. Brett himself owned a place]. As a result Colonel Montgomery bought an eighty-acre site on Biscayne Bay a little more than ten miles south from the heart of Miami, where he built a home and greenhouses and began the nucleus of a palm collection.

Originating the ideas

He became so strongly interested in collecting palms and other tropical plants that he thought it would be good if the public could share his interest. Thus the idea of building a botanical garden came to him. But the garden must be in a location separate from his estate, for one of the first things that came to his mind was that there must never be an admission charge; the public must be free to enter the garden and walk over the grounds every day of the year.

In the meantime, Colonel Montgomery had read *Exploring for Plants* by David Fairchild, formerly head of the Plant Introduction Office of the United States Department of Agriculture. Even though he had not met Dr. Fairchild the book made a deep impression on him. He began to think of this newly planned botanical garden as a possible site to grow the many tropical plants which had been introduced over the years by Dr. Fairchild and his associates largely through the nearby Plant Introduction Garden of the USDA located on the old airbase site of Chapman Field.

It further occurred to him that the garden might be named after this plant explorer and thus the name Fairchild Tropical Garden was originated—originated even before a site had been se-

lected or the land purchased. But that was the way Colonel Montgomery did things. His mind worked like the mind of the accountant, which he was, and long before the site was selected he had in mind many of the details he wanted to develop in the garden.

He had no difficulty in getting the consent of Dr. Fairchild to help him to start the garden. He also sought the help of others, including Thomas Barbour, Harvard zoologist; Liberty Hyde Bailey, the great Cornell horticulturist; E. D. Merrill, world famous authority on Asiatic plants and head of the Arnold Arboretum, and William J. Robbins, director of the New York Botanical Garden.

Selecting site and architect

A site was eventually selected which, as it happened, was less than a mile north of the Montgomery estate. It was an eighty-three acre tract partly on a limestone ridge which extends south-westwardly from Miami to Homestead. The site was adjacent to Matheson Hammock on Biscayne Bay and was reputed to be one of the warmer areas on the mainland of Florida. Time has proved its reputation, because the Garden has gone through two severe freezes, in 1940 and also the near-record cold of the 1957-1958 winter, without serious damage to its most tender tropical plants.

The land was almost equally divided in two sections. Half of it was located on the ridge which is of sedimentary limestone formation. The rest of the acreage was in a mangrove swamp, which, to be of any value, would have to be filled, with the elevation brought up four or five feet. Experience told the developers that it would be possible to obtain the fill by dredging lakes in the area, thus providing water vistas as well as grassy vistas.

William Lyman Phillips, a one-time associate of the great American landscape architect, Frederick Law Olmsted, was retained to design the Fairchild Tropical Garden. He had only recently come to the Miami area from Lake Wales, Florida, where he had assisted Olmsted Brothers in the planning and the planting of the Mountain Lake Sanctuary where the Bok Singing Tower is located. Now considered by many to be

the dean of American landscape architects, the seventy-four-year-old Mr. Phillips is still retained as the Garden's landscape architect. He considers it to be one of the outstanding jobs of his career. Among his other jobs are the old city of Balboa, in the Canal Zone, and the major parks in Dade County, including widely known Crandon Park.

Sensible order—dedication

In laying out the Fairchild Tropical Garden, Mr. Phillips followed a plan that would provide the best display of the character of plants—their form and their texture. Their flowering and their fruiting would be extra dividends. The design has been so successful that landscape architects have come from many other places to study the layout. However, aesthetics was not the landscape architect's only consideration. Colonel Montgomery wanted a garden that would contain only tropical plants, arranged in a sensible order. Mr. Phillips laid the grounds out so that the families generally would be in groups to themselves, in plots which on a chart were given numbers. In the palm section, however, he reduced the plan further to genera, with each genus given its own plot where necessary. The palm collection was given the name of Montgomery Palmetum.

Although large plots were given for the families LEGUMINOSAE and MORACEAE, the numbers of species that make up these families are so great that only token representation of them was possible. The MORACEAE contains the very large genus of the figs, *Ficus*, which itself contains many trees that grow to be of tremendous size. The banyan (*Ficus benghalensis*) is an example. The figs alone would occupy the eighty-three acres so completely that not even a weed would have sun light to grow.

Mr. Phillips arranged the plots of palms and trees so that vistas and open areas were created. He has compared the use of voids, or open areas, with the open spaces in an art gallery, wherein one has room to walk and to view the pictures either from close range or from a distance, according to inclination. On the limestone ridge—the plot's upland section—the vistas and voids are made

of grass. In the lowlands the vistas and voids are of water, created by the dredging of lakes and lagoons to obtain material to fill in what was one time a mangrove swamp.

The Fairchild Tropical Garden was dedicated on March 23, 1938. Colonel Montgomery had made an agreement with the government of Dade County to take title to fifty-eight acres, leaving twenty-five acres of the eighty-three-acre site to be deeded to the Fairchild Tropical Garden Association, a non-profit corporation. The chairman of the board of county commissioners at that time was Charles H. Crandon, a native of Massachusetts, who had come to Florida and made a small fortune from a wholesale drug business. He was responsible for the founding of the Dade County park system, which was to become one of the outstanding park systems in the country. The two-thousand-acre Crandon Park, which has more than a mile of bathing beach and which Mr. Crandon obtained at no cost to taxpayers, was named in his honor. Colonel Montgomery and Mr. Crandon worked out a gentlemen's agreement between the Dade County park department and the Fairchild Tropical Garden Association for the operation and the maintenance of the garden. The major buildings were to be erected on the association's property and were to be maintained by the association under the direction of a board of managers. The county was to budget funds for the development and maintenance of its own side, which forms an extension of Matheson Hammock Park.

In deeding the property to the county and to the association, Colonel Montgomery inserted a provision which would return the property to his heirs if it were to be used for anything else than a botanical garden or arboretum. There also is a provision requiring that the name of Fairchild must be retained.

In the early days of the Garden's development, much of the funds for the initial work were supplied by Colonel Montgomery himself. Although it was operated theoretically according to a budget, there was hardly a time during the first several years that spending did not exceed the budget by several thousand dollars. But nobody worried about this "unbusiness-like" situation, since the founder not only authorized the

extra spending but always went into his own pocket to make up the deficit.

Some help in the development of the county side of the acreage was obtained through the Civilian Construction Corps. The Dade County park department also provided much labor and tree moving equipment for the early plantings. But Colonel Montgomery, who was sixty-five the year the Garden was dedicated, was in a hurry to see the planting move ahead. Thus he spent large sums of money to buy and to transport large palms and trees. South Florida homesteads and estates were searched for rare and interesting species. The design began to take shape within a few years, on account of the large numbers of mature things that were set out.

In the meantime, Colonel Montgomery, through the help of Dr. Fairchild who was widely known throughout the world on account of his many plant exploration journeys, initiated a major seed introduction program. Eventually almost every mail was bringing in material from different parts of the tropical world. Colonel Montgomery had large greenhouses at his own estate and these soon became filled with flats or pots of seedling palms, trees, shrubs, and vines. There seemed to be something of a frenzy in the operation, with Colonel Montgomery apparently impatient to see the Garden reach a ripe maturity while he was living. And the haste paid off, because at the time of his death in 1953 it had advanced so well that one might consider it as having reached maturity.

The war years

While the Garden may have reached maturity from the standpoint of a hasty observer, every experienced plantsman knows it is impossible to build a great botanical garden within so short a time. A catalog of the permanent plants, published in 1949, lists over a thousand species in four hundred and sixty-nine genera. That doesn't seem like many plants for a mature botanical garden.

The Garden's plant introduction program suffered a serious setback during the war years. A plant collecting expedition to the East Indies in 1940, headed by Dr. Fairchild and financed by Mrs.

Anne Archbold, was cut short on account of the increasing number of war clouds forming over the Far East. From the time the United States entered the war in 1941 until long after the end of the war in 1945, plant introduction was at a standstill. The economic and political upheavals that took place in the Far East after the war made it difficult to renew the plant introduction program, and thus for several years very few important things were brought in and planted.

Fortunately, the plant introduction program is again in full swing, and the Garden is receiving new material about as fast as it can be grown and planted. A special effort has been made to build the palm collection, which now contains some four hundred species. The collection is growing at the rate of about fifty new species a year and strong efforts are being made to maintain this rate of increase.

The palm collection

The palm collection is the most important contribution to plant science that has been made by the Fairchild Tropical Garden. This is the only area of the United States where it is possible to grow outdoors so large a collection of palms. A goal of a thousand species has been set. It is not certain whether so many species can be grown in South Florida, because there is a tremendous variation in the tolerances of palms for various soils and climatic conditions. Some palms are native to the tropical rain forests and do not do well in Florida where the year is equally divided between a marked dry and a marked wet season. Others native to the tropical highlands dislike the lowland limestone soils of the Garden. Still another large number of palms thrive in the equatorial forests of Indonesia or the Amazon basin, and many of these are too tender for South Florida's subtropical climate. By improving our growing conditions for palm seedlings, however, several species are being established which formerly were believed impossible to grow in Florida.

The Fairchild Tropical Garden is working very closely with the Bailey Hortorium at Cornell University in the



FLORIDA STATE NEWS BUREAU

***Arenga pinnata*, the Sugar Palm,**

never fails to attract attention with its huge bloom clusters, especially from visitors who have never seen a large palm in flower. This palm is an important source of sugar in the Far East, the tapped flower spathe yielding large amounts of sweet liquid.

development and in the use of its palm collection. As most plantsmen know, the late Dr. Bailey became very much interested in palms during his latter years, and he built at Ithaca, New York one of the largest herbarium collections of palm specimens in the world. Several years before his death he appointed a successor, Harold E. Moore, Jr., who now is recognized as one of the world's few living botanical authorities on palms. Dr. Moore works directly with the Fairchild Tropical Garden on the problems of palm taxonomy.

While serving as a living collection for use by students of the palms, the Fairchild Tropical Garden's palm collection also serves an educational purpose. Persons interested in palms come to Miami from far away places to see this collection. Tourists come to the garden in large numbers to see not only the palm collection but other tropical plants. And seeds of palms suitable for cultivation are widely distributed in Florida from the Garden collection. For instance, the sugar palm (*Arenga pinnata*) has recently fruited at the Fairchild Garden for the first time in the United States. It appears to be fairly hardy and should thrive throughout much of South Florida. Accordingly the Garden is now making an effort to distribute this handsome palm widely in the area.

Introducing plants

When the Garden receives enough plants of a species for distribution purposes, the first concern is to see that members of the Association have first choice. Distribution is held each spring and members are supplied with a list of plants. Each member is entitled to three plants. A small charge is made for each plant. Surplus plants from distribution are then offered to members for sale and any remaining after that are then offered to the public.

Another way that new species of plants are distributed is to nurserymen. The Garden fortunately has many friends among South Florida nurserymen, and seeds are sold to them at nominal prices, or trades are made in order that the seeds of rare fruiting species are not lost.

Cycads, the public, philodendrons

Comprising another important collection in the Fairchild Tropical Garden are the cycads, CYCADACEAE. The Garden has about half of the hundred species in the world. Many of them, however, are still in a juvenile stage and it may be several years before these younger ones begin to flower. This group of plants has been of much greater interest to botanists and to trained horticulturists than to the public. Most persons of small experience in the world of plants look upon them as another group of palms, or perhaps as relatives of the ferns, and except in the case of a few unusual species, especially when in flower or in fruit, visitors saunter by without giving the cycads a second glance.

But while the likes and dislikes of the public are considered, it is the policy of the Garden not to be overwhelmed by the popular demand for the spectacular. There is hardly a day in the year when there are not a dozen or more plants in bloom, often one or more spectacular trees, shrubs, or vines. It would be an easy matter to plant great masses of some of these things, as azaleas are planted in other gardens in the south, and when they come in bloom much ado would be made over them. Such a program would defeat the purposes of a botanical garden, however, and sidetrack it from a sensible goal. And in the tropics, there is another problem. There is no special time of year for bloom. It is true that there are times when there is more bloom than other times, but there is no period when the tropics is flowerless. Thus the Garden, being a tropical garden, could not establish the flowering displays that it is possible to do, for instance, at the Arnold Arboretum or at the Montreal Botanic Garden.

But to cater somewhat to the public's desire for brilliance the Garden recently began a trial with plants that are suitable for use as ground covers and which bloom periodically or are attractive because of the form or color of their foliage. Also in some of the more mature palm plots where there is considerable shade, a beginning has been made of what eventually will be one of the most complete collections of philodendrons anywhere. This collection was started with the help of Monroe R. Birdsey of



NIXON SMILEY

***Cocos nucifera*, the Coconut Palms,**

seen at most tropical beachheads, grows in The Fairchild Tropical Garden in at least a half dozen varieties. The tall one shown here is the common coconut; the smaller ones in the foreground are the yellow and the orange Malay dwarf varieties.

the department of botany at the University of Miami and an authority on aroids. The collection will serve several purposes. It will be of use for taxonomic studies by Dr. Birdsey and others interested in this group. It will provide horticultural material for study and for use as illustrations in connection with the forthcoming publication of a new edition of Bailey's *Cyclopedia of Horticulture*.

Most of the philodendrons will be grown out-of-doors, in lush jungle-like settings, and with overhead sprinklers to provide not only irrigation but to simulate the humid conditions of the tropical jungle. It is hoped that the lushness of this setting will win some applause from visitors.

Buildings and service

Several years ago, while Colonel Montgomery was living, an attempt was made to establish a show of colorful foliage plants and orchids in greenhouses within the garden, to which an admission charge was made. This idea had some merit, but was never completely satisfactory. In the first place it was a costly program, and a guide was required if the public was to obtain much educational benefit. Furthermore, the displays took up a lot of valuable space in the greenhouses. Recently the board of managers gave permission to discontinue the show houses. Henceforth the space will be used for a more practical purpose, and all plant shows will be outside where the public can see them free, for there is no admission charge to the Garden.

The only charge that is made to visitors is for a guided motorized tour of the garden. The tram ride lasts about a half hour, and takes the visitor through the more interesting parts of the Garden, including the palm collection, flowering tree collection, vine collection, and through a portion of the lowland where the water vistas lined by palms and trees may be enjoyed.

A number of buildings have been erected in the twenty-five acre portion owned by the Association. The first building was the Montgomery Library and Museum, completed in 1940. Funds for this building were donated by the partners in the accounting firm of the

Gardens' founder—Lybrand, Ross Bros. & Montgomery—whose main office is in New York. The museum houses objects made of the parts of palms, and is also known as the Palm Products Museum. The Library contains two collections: one a collection of technical books on tropical botany and closely related subjects, and the other section a collection of books on gardening and landscape architecture which members may take home to read. Anyone, however, may use the library for serious reference work. The administrative offices are in one wing of the library building.

An auditorium, the Nell Montgomery Garden House, was built in 1950. Colonel Montgomery built this structure and its name honors his wife. The auditorium is used for membership activities and is occasionally used by garden clubs or horticulture groups.

A director's house was donated in 1953 by Arthur Vining Davis. This building is not now occupied permanently but is used for the time being as a guest house for visiting plant scientists. Also on the grounds is a building where the director and superintendent have their offices. Close by is a gift shop and a snack bar. Tentative plans have been made for a building that will house records and a herbarium, and also contain laboratories for staff and visiting botanists.

Planned research program

The Fairchild Tropical Garden has but a small staff now, with only two members trained in botany and horticulture. Stanley Kiem, a botanist, is superintendent, and Derek Burch, a graduate of the University of Wales, is a horticulturist. P. B. Tomlinson, research associate of Kew Gardens and a graduate of the University of Leeds, and Robert Read, now completing work for his master's degree at Cornell University, will join the staff in June. Dr. Tomlinson will head a small research program for which funds were raised during the past year.

The sparking of a research program came as a surprise, following G. H. M. Lawrence's stirring talk at the annual meeting of the Fairchild Tropical Garden Association in March 1959. Mrs. Forbes Hawkes, an influential member,



NIXON SMILEY

The Montgomery Library and Museum Building. (Palms are: *Latania loddigesi* (left) and *Arecastrum romanzoffianum* (right)).

Nell Montgomery Garden House, an auditorium seating 500.



NIXON SMILEY

offered \$6,000 towards bringing a research man to the Garden, provided other members gave their support. Over \$20,000 has now been raised and plans are underway to build a small laboratory building. Dr. Lawrence, named to the board of managers at the same meeting, has taken a strong interest in the development of the Garden's research program and in the furtherance of the Garden as a tropical botanical center.

Dr. Tomlinson will continue studies in the palm, which he launched three years ago in Ghana, Africa, and whose basic book on the anatomy of the palm is now in the hands of a publisher. He will continue his investigation of the palm's anatomy. Mr. Reed will assist in establishing a herbarium and will revise and bring the plant records up to date.

The director has been fortunate to have some of the best minds in the field of plant science looking over his shoulders in the running of the Garden. He has been sensitive to their suggestions, carrying out any possible.

The advisers are Monroe R. Birdsey, University of Miami; I. D. Clement, Harvard University; W. H. Hodge, Longwood Gardens; E. W. McElwee, University of Florida; Harold E. Moore, Jr., Bailey Hortorium; W. J. Robbins, formerly director of the New York Botanical Garden and George D. Ruehle, University of Florida. The last named is head of the Subtropical Experiment Station at Homestead, some fifteen miles from the Garden. Dr. Ruehle and his staff have cooperated very closely with the Garden in solving the problems that are constantly coming up with insects, plant diseases, plant nutrition, and also in plant identification. The late R. Bruce Ledin, a horticultural taxonomist on the Subtropical Experiment Station staff, worked closely both in plant introduction and identification. Another staff member, J. L. Malcolm, is making a study of the turf soil in a search for information that might be of help to home owners and caretakers throughout South Florida. The Garden also enjoys full cooperation of the State Plant Board, whose inspectors make regular visits and thus help to forestall serious inroads by insect pests or plant diseases.

Educational program

Education is the weakest point right now. The Fairchild Tropical Garden has no staff member who has time or the training to teach courses. Thus instructors must be sought elsewhere. The most successful educational idea so far was a course in gardening taught by one of the Dade County Agricultural Agents. This course is to be repeated within a short time. In the meantime a staff member of the Subtropical Experiment Station has taught a ten-week course on plant identification.

Many stories about the Garden's new plans, its ground cover trials, and its experiences with plants in general are reported in local newspapers and magazines. Articles on the plan also appear in its bulletin which is issued four times a year. The Bulletin goes principally to members of the Association, which now exceed fifteen hundred. Publication soon will be resumed of the Garden's *Occasional Papers*, which were discontinued upon the death of Dr. Fairchild, who himself had written most of them from the date of founding until his death in 1954. These papers will be issued under the name of *Fairchildiana*, and sub-headed "Occasional Papers of the Fairchild Tropical Garden." The papers will contain semi-popular articles on the Garden's plants, and especially the plants of its own introduction. But there also will be articles on the usage of plants in landscape design, and there will be studies of important groups in collection, such as the cycads and the palms.

An important part of the educational program for members each year is the annual Robert H. Montgomery Science Lecture Series, which brings some of the nation's top scientists to Miami. These lectures are not limited to botany or horticulture, but may cover a wide number of fields, including atomic energy, medicine, or general biology.

Finances

Support for the operation of the Fairchild Tropical Garden comes mainly from members, through membership fees and special gifts. Membership fees bring in about twenty thousand dollars a year. Another twelve to fifteen thousand are

made from a two-day sale of plants and such second-hand things as furniture, books, clothes, and even family heirlooms. This December event, called the "Ramble," has become one of the most popular things of its kind in South Florida. Plants offered for sale at the Ramble are surplus plants left after distribution to members, and those sold also include a great many plants given by nurserymen. It has been the policy not to propagate and to sell common things that are normally grown by nurserymen in the area in order to avoid criticism arising from the operation of a competitive enterprise.

Since it takes close to fifty thousand dollars a year to operate the Association's side, other sources of income are needed. Special gifts from the more wealthy members help. One member, for instance, gives more than a thousand dollars a year for the library. Sales from the gift shop and snack bar, as well as fares received from guided tour rides, help balance the budget. The Fairchild Tropical Garden has no large endowment to provide it with a regular annual source of income.

The beginning of a reserve fund was started in 1954 immediately after the death of Colonel Montgomery. This fund now exceeds three hundred thousand dollars and has been increasing at an annual rate of about fifty thousand. None of the income from the fund has ever been used. It is re-invested to build the fund to a million dollars as quickly as possible. The Garden's reserve fund has been swelled considerably a number of times through the generosity of the Garden's wealthy members while sizable amounts have been left also in the wills of the less fortunate members.

Upon the death of Colonel Montgomery the management found itself faced suddenly with the problem of having to develop and to guide a new program. The founder's death meant that the first phase, development—its founding and its basic planting—had been completed. The supporter was gone. The management, which since the founding of the garden had looked to its founder-director for guidance, was without experienced leadership in the operation of a botanical garden. The first consideration, of course, was to raise operation money. Preservation as it was in the

spring of 1953 took precedence over everything else.

Time for decision

Except for a year when Paul H. Allen served as director the Garden was operated without a director until July 1956 when the present director was appointed. At that time the Garden was beginning to get on its feet financially but hardly any other kind of progress had been made in three years. The future was as undecided as it was immediately after the founder's death. Even its existence was still uncertain because it lacked a positive program of development. The new director was himself without any good ideas to organize a sound program. He had agreed to take the job for a year in order to make a study and possibly come up with suggestions for a course to follow. He had had no experience with botanical gardens, and he was not even a trained plantsman, having been all of his mature years a newspaper man. He was a *Farm & Garden* editor of the *Miami Herald* and took the directorship on a part-time basis.

One of the first things he discovered was the wide-spread interest among plant scientists in the Fairchild Tropical Garden. Everyone contacted not only was willing but very anxious to do everything possible to help put the Garden on a sound footing. Its possibilities seemed to be appreciated. The search for advice was richly rewarded and a number of eminent plant scientists not only gave freely with their advice, but they also visited the Garden and went over the problems on the ground.

The ultimate aims

After nearly three years of program testing, the Fairchild Tropical Garden has come up with the following aims:

1. The ultimate development of a tropical botanical garden containing collections suitable for study by plant scientists.
2. An educational program of increasing benefit to local home owners and to plantsmen.
3. A show garden for visitors, and especially for visitors seeing a large col-



NIXON SMILEY

The Fairchild Rambler,

a tram train, is provided for visitors—walking being such an unpopular pastime. Last year, at fifty cents a head, over ten thousand persons took the easy way around the grounds on this guided tour.

lection of tropical plants growing outdoors for the first time, but without succumbing to demand for gaudiness and unnaturalness in plant displays.

4. To establish permanency by building a sizable reserve fund, the income from which one day would be used to support education and research.

5. To build a botanical garden as a cultural center of prime importance to the Miami area.

This obviously is a long range program, but one which already is beginning to bear good fruit. The Garden is enjoying warmer support in the Miami community every year and more and more people are beginning to realize the importance of a botanical garden to a community. The new metropolitan government, under which the public owned side of the Fairchild Tropical Garden is operated, is beginning to see the importance as a prestige builder for an area which is so widely believed to be only a

playground for tourists. And other botanical gardens and educational institutions are beginning to realize the necessity of having a tropical botanical garden within the continental United States, and they are making more use of the facilities. One day a request may come from the Yale Forestry School for seed of a tropical tree, or a request may come from Harvard University for twigs of certain species for special studies in plant identification problems. In one week the Garden received requests from a North Carolina State University botanist for the trunk of a cycad, a University of California horticulturist requested a specimen from a certain species of *Ficus*, and the Bailey Hortorium asked for the pickled flowers of a palm for taxonomic study.

And so things go at present. The Fairchild Tropical Garden encourages these requests, for in filling them it serves a useful purpose to plant science.

Water vistas add an important detail in the landscape.



NIXON SMILEY

Rubel

Berkeley

U.S.D



Rubel, finest selection of wild blueberries, averages less than half the size of **Berkeley**, one of Dr. Coville's "Big Six" originations. **Coville** has proved to be one of the best commercial varieties. It is the most planted of the "Big Six" varieties. **Dixi** and Coville resulted from one hybridization, although the latter was introduced 13 years after the former. **Earliblue** is the earliest of the northern varieties.



Dixi

Coville

U.S.D.A.

Earliblue

Blueberry

Breeding

GEORGE M. DARROW*

Past

Present

Future



U.S.D.A.

The cultivated blueberry industry is still based entirely on the varieties resulting from breeding and selection work of the late Frederick Vernon Coville, of the U. S. Department of Agriculture. He not only had the imagination to see what might be done with wild blueberries but also carried the research through to the establishment of an industry. Raised in New Hampshire and familiar with the flora there, Dr. Coville made his first two selections (Brooks and Russell) among the wild blueberries of his

*Collaborator, Crops Research Division, Agricultural Research Service, U. S. Department of Agriculture.

native State in 1908-1909. He made his first crosses between them in 1911. He enlisted the help of many individuals in obtaining the largest and best fruited wild blueberries for use in breeding. Although he tested many selections from many areas, those from which our northern highbush varieties have come were selected by him in New Hampshire and New Jersey. Between 1911 and 1936, when Dr. Coville retired, about sixty-eight thousand seedlings had fruited, and about two thousand acres of named varieties resulting from his work had been planted. He and his associate, Oliver M. Freeman, left seedlings and

seed from which about thirty thousand more seedlings have been fruited. Because those seedlings represented the accumulated experience of more than twenty-five years of breeding, some of them were finer than the ones Dr. Coville named. Fifteen more varieties have been named and introduced. Thus, varieties selected from about a hundred thousand seedlings (together with Rubel) are the basis of the cultivated industry today.

Beginning of an industry

The first varieties from Dr. Coville's breeding — Pioneer, Cabot, and Katharine—were named and introduced in 1920 and Greenfield and Rancocas were introduced in 1926. Though relatively small-fruited by today's standards, these varieties together with the Rubel selected from the wild, were superior enough to warrant the beginning of an industry. In 1928 the Jersey and Concord, in 1930 the Stanley and June, and in 1931 the Scammell were introduced. The industry in Michigan is still largely based on Pioneer, Rancocas, Rubel, and Jersey. In 1936, before he retired, Dr. Coville named two other notable varieties, Weymouth and Dixi. Weymouth is a large, early, rather dwarf, low quality variety, and Dixi is a large, late, high quality one. Actually three steps in increase in fruit size were made—the introduction first of Pioneer and Cabot; next that of Jersey, Concord, Stanley, and Scammell; and third, that of Weymouth and Dixi.

Dr. Coville was helped very greatly in his work by able grower cooperators: for the first twenty years especially by Elizabeth C. White and the J. J. White Company, of Whitesbog, New Jersey, on whose property seedlings were grown and selections propagated and tested. Later the Atlantic Company and the Crabbe Company, of New Jersey, and H. G. Huntington, of North Carolina, as well as others assisted in growing seedlings and in making selections. Grower cooperation was so successful that it is still being continued.

Table 1 gives the estimated acreage, in percentages, now planted to each of the thirty varieties originated by Dr. Coville, listed in order of their dates of naming or introduction.

Table 1

Percentage of Estimated 1958 Acreage¹ Planted to Each of 30 Varieties Originated by Frederick V. Coville.

Variety	Year Hybridized	Year Introduced	Estimated Acreage
Pioneer	1912	1920	0.5
Cabot	1913	1920	0.5
Katharine	1913	1920	0
Greenfield	1913	1926	0
Rancocas	1915	1926	4.0
Jersey	1916	1928	32.0
Concord	1916	1928	0
Stanley	1921	1930	5.0
June	1919	1930	0
Scammell	1915	1931	1.0
Redskin	1913	1932	0
Catawba	1913	1932	0
Wareham	1915	1936	0
Weymouth	1928	1936	14.0
Dixi	1930	1936	1.0
Atlantic	1925	1939	1.0
Burlington	1916	1939	1.0
Pemberton	1921	1939	3.0
Berkeley	1932	1949	5.0
Coville	1930	1949	8.0
Wolcott	1934	1950	7.0
Murphy	1934	1950	1.0
Angola	1934	1951	0.5
Ivanhoe	1933	1951	0
Bluecrop	1934	1952	2.0
Earliblue	1936	1952	4.0
Herbert	1943	1952	0
Croatan	1934	1954	0.5
Blueray	1934	1955	0
Collins	1936	1959	0

¹About 9 per cent of the estimated 1958 acreage is planted to Rubel, a variety selected from the wild by Elizabeth C. White.

The "Big Six" varieties

The varieties termed the "Big Six" comprise the six more recently introduced varieties that bear very large berries, ripening from early to late. Although Jersey still makes up about thirty-two per cent of the total acreage, the new "Big Six" are being propagated rapidly and have such superior horticultural qualities that they are rapidly replacing older smaller berried varieties. Table 2 indicates their rating for several characters.

The ancestry of the "Big Six" is given in Table 3. It will be noted that one lowbush and five highbush varieties se-

Table 2
The "Big Six" Highbush Blueberry Varieties
Rated for Several Characteristics,¹

Variety	Season ²	Size ³	Color	Dessert-quality	Cold-resistance	Scar
Earliblue	9	70	8	8	7	8
Blueray	7	60	8	9	8	7
Bluecrop	6	70	9	8	8	9
Berkeley	5	65	10	6	7	8
Herbert	3	60	6	10	8	8
Coville	2	65	8	9	7	8

¹Ratings from 1 to 10: 10 the best and 1 the poorest.

²Season ratings (early to late): 9 earliest variety listed, about 5 days between units.

³Size measured in number of berries per half-pint cup.

lected from the wild enter into their makeup.

Dr. Coville named no varieties from his breeding work in North Carolina but left thousands of seedlings fruiting there. He used selections from the wild North Carolina highbush in this breeding. It was well that he did, for some of the selections proved to be resistant to a serious southern blueberry disease—stem canker. From the four varieties, Angola, Wolcott, Croatan, and Murphy, relatively resistant to the stem canker, have been named and are already important varieties there (Table 4). Although highly resistant for about twenty years, they are now showing some canker infection, probably caused by new strains of the causal fungus to which these varieties are at least partially susceptible, as shown by their resistant rating.

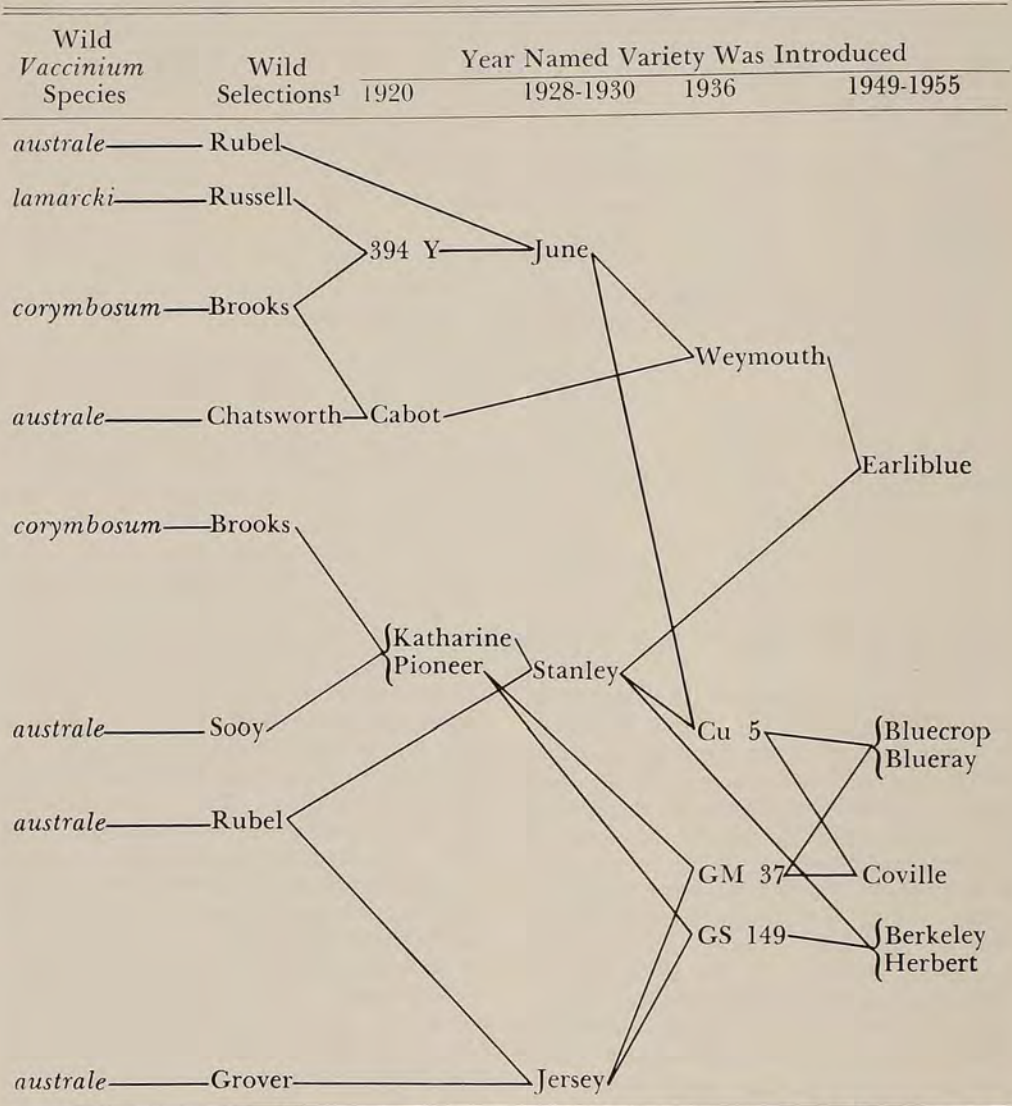
1958 seedlings—the "Big Ten"?

About twenty thousand acres of cultivated blueberries are being grown today, the acreage having doubled about each six years for many years. Blueberry is the one temperate climate fruit crop with rapidly increasing acreage. The crop for 1957 was valued at fifteen million dollars. To enable the industry to continue to expand, varieties superior in several

respects to older ones must be bred and introduced. With this in mind the writer and his associates have extensively bred blueberries since 1939 to obtain varieties that might keep the good qualities of the "Big Six" and not have their more serious limitations. They have carried on the breeding in cooperation with State agricultural experiment stations (especially those of New Jersey, North Carolina, Georgia, Florida, and Maine) and with private cooperators (especially S. A. Galletta of New Jersey, A. C. Elliott of Michigan, J. H. Alexander of Massachusetts, and Gale Harrison, Gordon Love and Jackson Batchelor of North Carolina). Varieties to be introduced in the next ten to fifteen years may be sufficiently superior to the "Big Six" to justify acreage increases in line with the past rate of increase.

The crosses made recently are aimed toward obtaining larger size berries for fresh market, non-dropping, *i.e.*, holding on the bush till all are ripe (for lower picking costs), light blue color, high flavor, firm texture, hardy flower buds and plant, canker resistance (in North Carolina), mummy berry resistance (in the North), and earlier and later ripening. Crosses already fruited indicate that these objectives can be obtained, if selections are made from large numbers of seedlings.

Table 3
Ancestry of the "Big Six" Blueberry Varieties



¹Rubel, Chatsworth, Sooy, and Grover were selected from New Jersey; Russell and Brooks from New Hampshire.

Table 4
Highbush Blueberry Varieties for North Carolina
rated for several characteristics.¹

Variety	Season ²	Canker resistance ³	Size ⁴	Color	Dessert-quality	Cold resistance	Scar
Angola	10	8	80	6	7	6	9
Wolcott	9	9	80	7	6	6	9
Croatan	9	6	75	8	8	6	9
Murphy	8	9	80	7	7	6	9

¹Ratings from 1 to 10: 10 the best and 1 the poorest.
²Season ratings (early to late): 10 earliest variety listed; about 5 days between units.
³Ratings for canker resistance may change if new strains of the canker fungus affecting these varieties appear.
⁴Size measured in number of berries per half-pint cup.

Results of the breeding work now under way is illustrated by the seedlings raised in 1958 at Beltsville from seed obtained in previous years. The four primary objectives of these crosses were to produce berries that would be—very late, very hardy, frost-hardy, and high-flavored. Other seedlings in the cooperative program were raised by the North Carolina, South Georgia, and Florida Agricultural Experiment Stations. The following list includes most of the high-bush seedlings raised at Beltsville.

<i>Cross and Purpose</i>	<i>Number</i>
<i>For lateness</i>	
Coville \times Shaw Late	878
<i>For hardiness</i>	
Ashworth \times G-65	3,680
Ashworth \times 11-93	3,200
11-93 \times Ashworth	1,748
E-3 \times E-118	224
11-93 \times E-118	190
<i>For frost hardness</i>	
11-93 \times Bluecrop	698
Herbert \times Bluecrop	2,938
<i>For high flavor</i>	
Earliblue \times BM-22	342
BM-22 \times Berkeley	160
Earliblue \times M-37	1,127
11-93 \times M-37	1,480
11-93 \times M-12	900
11-104 \times 11-93	825
11-104 \times F-72	1,110
F-72 \times 11-93	1,683
E-3 \times 11-93	2,456
E-3 \times G-65	950

For the first objective—lateness—one cross was made to test the Shaw Late selection from the wild for its breeding value for lateness. For the second objective—hardiness—five progenies were raised to complement progenies already in the field, one parent being either Ashworth or selection E-118 (Ashworth \times Earliblue). For the third objective—frost hardiness—two progenies to complement others already fruited or being raised were grown. For the fourth objective, the ten progenies were all raised primarily for high flavor but the high-flavored selections were crossed with others so that selection for greater firmness and size, better color, and so forth would be possible. In other years the crosses might be for other objectives, such as better scar, earliness, or disease resistance.

The job ahead

Perhaps the easiest way to point out what is needed in future breeding and how big a job remains, even with the limited vision of 1958, is to list some current objectives and to make brief comments on present varieties. If the limitations of each variety were corrected in a new variety of the same season, we might easily have varieties whose fruit would be worth a thousand dollars an acre more than at present. Thus, for the "Big Six" and the newly introduced Collins, sister to Earliblue, the following summary of desirable qualities may be given:

	<i>Desirable Qualities</i>	<i>Undesirable Qualities</i>
Earliblue	Early, firm, non-dropping	Not hardiest, fair scar, not best flavor
Collins	2nd early, firm, non-dropping	Same as above
Blueray	3rd early, firm, fine flavor productive, hardy	Tight cluster, wet scar
Bluecrop	4th early, light blue, firm, hardy	Not best flavor, drops some, hard to propagate
Berkeley	5th early, lightest blue, firm, large	Too bland flavor, fair scar, drops, not hardiest
Herbert	7th early, best flavored, largest, hardy	Too dark, too soft, fair scar
Coville	8th early, high flavored, large, firm	Fair scar, acid, not hardiest

Thus, if a new "Big Ten" set of varieties (to extend the season still further) with a five-day sequence of ripening had the hardiness of Bluecrop, the flavor of Blue-ray, the color of Berkeley, the scar of Burlington, the non-dropping of Earli-blue, the fine cluster of Berkeley, and the size of Herbert, such varieties could warrant the growing of a much greater acreage than at present. And for North Carolina and westward in the South highbush varieties with greatly improved color, flavor, firmness, size, and canker and mite resistance are needed to further a greatly expanded acreage there.

There is also need for breeding for resistance to mildew, witches'-broom-rust, and leafspots, resistance to the blueberry mite, resistance to leaf hoppers that transmit the stunt virus disease or resistance to infection by stunt, and to cane blights.

Improving the rabbiteye

A southern species, *Vaccinium ashei*, commonly called the rabbiteye blueberry, was surveyed by Dr. Coville but until recently had not been used to any extent in breeding. With the help of extensive surveys by J. M. Batchelor, F. L. O'Rourke, and by many other people, superior selections were located in western Florida and southern Georgia. The remarkable vigor, productivity, and tolerance to drought and heat of this selection make it a superior horticultural plant. Its berries have better scars than those of most northern varieties and a great range of flavor and other desirable characteristics. Full-grown bushes have averaged more than a bushel of berries each.

A breeding program with the rabbiteye blueberry is now under way to obtain superior varieties for fresh market, canning, and freezing in the Deep South. Many thousands of hybrid seedlings have been grown and many selections tested. From this breeding work, six varieties, which seem sufficiently good to form the basis of a commercial industry, have been named. These are Callaway, Coastal, Tifblue, Homebell, Garden Blue, and Menditoo.

These first selected varieties correspond to the early highbush varieties and con-

tinued breeding within the rabbiteye varieties may be expected to result in very superior new ones. Varieties with the flavor of Callaway, the color of Tifblue, the size of Black Giant, and the vigor and productiveness of Garden Blue are needed.

The rabbiteye and highbush have been crossed to obtain pentaploids. These hybrids produce little or no pollen, but do set fruit with pollen from either parent. Possibly by backcrossing, the fine qualities of rabbiteye may be bred into highbush varieties and those of highbush into rabbiteye.

The cluster-fruited species

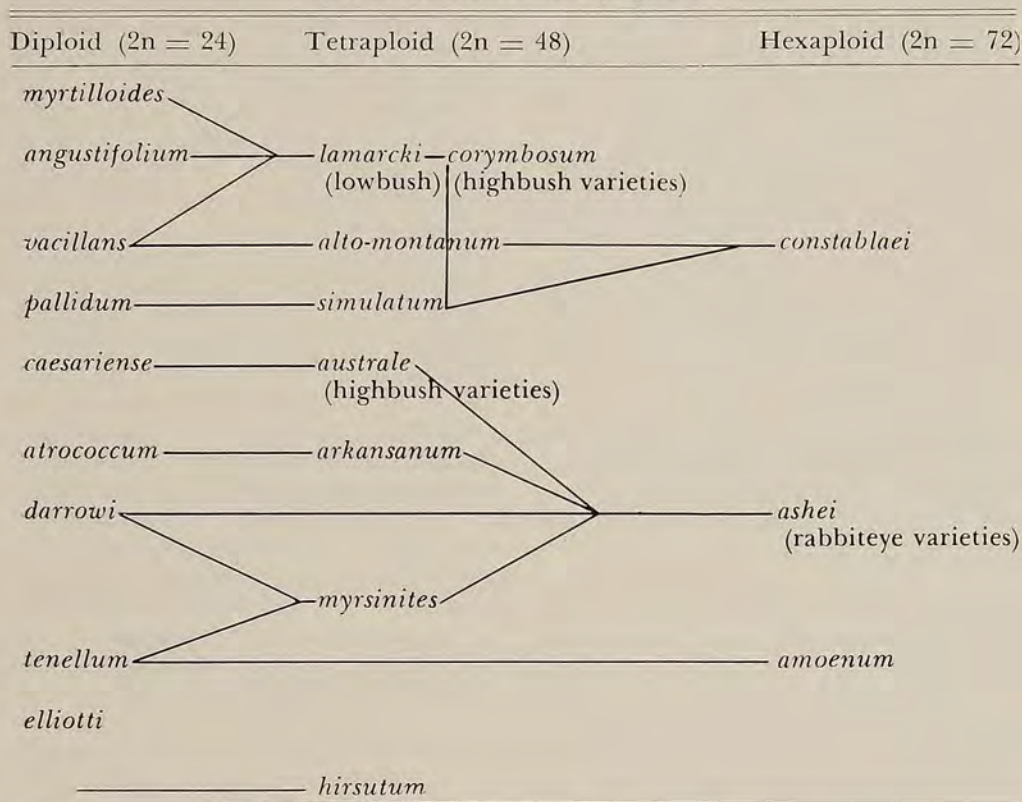
To obtain high yields under cultivation, selections of cluster-fruited species are essential. They may produce ten to twenty quarts a bush while equally large bushes of species bearing berries singly may bear only a quart. Hence, the present productive cultivated varieties have come from four species of the cluster-fruited type, *lamarcki*, *corymbosum*, *australe*, and *ashei*. These species (3 tetraploids and 1 hexaploid, respectively) are extremely heterozygous and have a great range of characters from which to select superior varieties. The possibilities in breeding within these species are still enormous. The botanical group to which they belong is native to eastern North America from Florida and Louisiana to Newfoundland and Labrador and includes twenty or more species. These other species also have a great range of desirable horticultural characters not found in the four species from which come cultivated varieties.

The chromosome numbers are given and relationships of the eastern cluster-fruited species are suggested in Table 5.

All the species with the same chromosome number seem to be completely interfertile. Fertility between different chromosome levels cannot be predicted. Diploid species do not cross naturally with tetraploids; tetraploids cross with hexaploids and give partially fertile pentaploids; and a few diploid species cross [with difficulty] with the hexaploid *ashei* and give tetraploids, but none so far tested cross with *constablaei*, also a hexaploid.

Table 5

Botanical relationships of eastern North American
Cluster-fruited blueberry species¹



¹This table attempts to show the relationships of the 9 diploid, 8 tetraploid, and 3 hexaploid species. Currently the U. S. Department of Agriculture and cooperating experiment stations are using 11 species in breeding: *myrtilloides*, *angustifolium*, *atrococcum*, *darrowi*, and *tenellum* of the diploids; *corymbosum*, *lamarcki*, *australe*, and *myrsinites* of the tetraploids; and *constablaei* and *ashei* of the hexaploids, and still have crosses with at least 2 others, *vacillans* and *alto-montanum*.

As stated previously, improvement of present varieties by recombining qualities already in them is in progress and needs continuing, but the lowbush and the two highbush species have made possible the present flourishing industry. The longer time program of adding new qualities from these and many other species needs further attention. Nine of these cluster-fruited species may be useful, as follows:

Vaccinium darrowi and *V. tenellum*. Varieties obtained by crossing each of these two southern lowbush, spreading diploid species, first with the rabbiteye to obtain tetraploids and then with highbush, should extend blueberry growing even to the southern tip of Florida, and

give tetraploids with far greater heat and drought resistance, earliness, and low chilling than available now.

V. myrsinites. This southern evergreen lowbush, spreading tetraploid native even south of Miami can be crossed directly with the highbush to give heat and drought resistance. Though crosses so far have been rather disappointing, only a beginning has been made.

V. constablaei. This hexaploid seems to have a long rest period and may be especially useful in crossing with rabbiteye to furnish later, hardy varieties. Again, the first crosses have been disappointing but much wider exploration of the use of this species is needed.

V. vacillans and *V. alto-montanum*. These two lowbush species, a diploid and tetraploid, respectively, are much hardier than *tenellum*, *darrowi*, and *myrsinites* and may be useful in obtaining hardy varieties with drought resistance, however, *vacillans* is very susceptible to "stunt" virus, and in breeding for virus resistance the use of plants free of virus selected in severely infected areas may be necessary. At times *alto-montanum* appears to be simply an autotetraploid of *vacillans* or *pallidum* and at other times it has the half-high or highbush stature of an allotetraploid derived from *vacillans* hybridized with some highbush species.

V. angustifolium. This lowbush diploid of the *lamarcki* type ranges far north into Canada and seems about two weeks earlier than present highbush varieties. Possibly it might keep and transmit its earliness as well as its hardiness if made into a tetraploid.

V. myrtilloides. This light-blue-fruited northern diploid lowbush is hardy rather far north and may be useful in breeding hardy northern sorts.

V. atrococcum. A very early, black diploid highbush of which selections that ripen all their berries at one time and still do not drop have been found. If made into a tetraploid, it might be useful in breeding for early non-dropping varieties.

Some of the more important desirable characters of these nine species so far recognized may be summarized as follows:

Lowbush species:

V. alto-montanum, 4 \times —drought resistance, low- to highbush.

V. angustifolium, 2 \times —earliness and hardiness, prostrate, lowbush.

V. darrowi, 2 \times —heat and drought resistance, very low chilling, lowbush.

V. myrsinites, 4 \times —heat and drought resistance, very low chilling, lowbush.

V. myrtilloides, 2 \times —hardiness, blue fruit, lateness, lowbush.

V. tenellum, 2 \times —heat and drought resistance, low chilling, lowbush.

V. vacillans, 2 \times —drought resistance, lowbush.

Highbush species:

V. atrococcum, 2 \times —earliness, non-dropping, vigor, highbush.

V. constablaei, 6 \times —highbush, long rest period, hardiness.

Other genetic material

Much genetic material is available in species outside the eastern cluster-fruited group. To mention a few, on the Pacific Coast is *V. ovatum*, the evergreen blueberry with its fruits in clusters (it is the "Evergreen Huckleberry" of the florist trade); in the high mountains of central and northern South America are closely related species that may hybridize with *ovatum* directly or, after chromosome doubling and crossing, may give large, fine-fruited sorts of very different flavors than those of the eastern highbush; *uliginosum*, a hardy lowbush, has already been used in breeding by the Washington Experiment Station and may be a source of hardiness and resistance to cracking and to the western stem diseases, including rust; *myrtilis*, a non-cluster species native to much of northern Europe and to the northern tip of Alaska, may be useful in extending blueberry growing to the far North if productive fertile hybrids with cluster-fruited species can be obtained; *membranaceum*, a non-cluster species, native to the Cascade and Rocky Mountain areas of western North America, is large-fruited and extremely drought resistant. Sheep graze on the succulent leaves of the bushes after all grass has dried up, and a well-developed program of introducing its drought-resistance into cultivated varieties is needed.

The blueberry is becoming a major fruit crop. Commercial fields are productive compared with those of other berry crops. Large areas, not well adapted to most other crops, are adapted to its production. The importance of the blueberry in the years ahead seems directly related to the breeding of improved varieties. For example, if all varieties had scars as good as the scar of Bluecrop, the market would not need to be afraid of the berries spoiling on the counter and could handle blueberries with a lower markup price in much greater volume. If all varieties were non-dropping, like the Earliblue, and were still high-flavored when all were ripe, all the berries could be harvested at one time and at a lower cost than at present. These and other qualities should make a steadily increasing acreage of blueberries warranted.

The following list gives some objectives in blueberry breeding, their purposes, and suggests materials to be used

<i>Objective</i>	<i>Purpose</i>	<i>Suggested Parents</i>
Dry scars	Fungi that rot berries enter partly through wet, large scars; breed varieties with dry scars for all conditions.	Burlington and Bluecrop have good scars; rabbiteye varieties excellent scars; some highbush selections dry scars.
Non-dropping	For cheaper harvesting, replace all varieties with those retaining high flavor and not dropping till all berries are ripe.	Earliblue, Collins, selections, and possibly <i>atrococcum</i> .
Late ripening	Obtain late tetraploids, ripening till frost to extend season.	Rabbiteye (<i>ashei</i>) (6x), <i>tenellum</i> (2x) or <i>darrowi</i> (2x).
Earlier ripening	Shorten flower-to-ripe-fruit period from 45 to 35 days.	<i>atrococcum</i> , a diploid black, very early highbush species; also selected lowbush diploids and tetraploids.
Large size	Reduce cost of picking.	No. 11-93 highbush.
Cold hardiness to -50° F.	Extend growing areas to northern New York and northern New England.	Ashworth and other selected wild hardy low- and highbush.
Cold hardiness	Obtain still greater hardiness, perhaps to -70° F.	Explore use of <i>myrtillis</i> , a non-cluster species hardy to north tip of Alaska, among others.
Short rest period	Extend growing areas to southern Florida.	<i>darrowi</i> and <i>myrsinites</i> .
Heat and drought resistance	Obtain varieties adapted to climate of South.	<i>darrowi</i> , <i>myrsinites</i> , <i>tenellum</i> , <i>ashei</i> (rabbiteye).
Extreme drought resistance	Obtain upland varieties.	<i>membranaceum</i> (a non-cluster species of Cascade Mountains).
Canker resistance	Obtain first-class canker-resistant varieties for the South.	Canker-resistant selections.
Varieties of <i>V. ovatum</i> type	Obtain plants with large, better flavored berries worth cultivation on Pacific Coast.	Species related to <i>ovatum</i> from Guatemala to Ecuador.
Double chromosome numbers	Use colchicine for new possibilities.	Diploids, tetraploids, hexaploids, and hybrids.
Other characters	Resistance to witches'-broom, mites, mildew and mummy berry; ripening at continuous low temperatures; greater vigor for cropping on 2-yr.-old plants; low bushes for ease in garden bird control; and adaptation to soils of higher pH.	Selections from hybrid progenies and from wild populations.

The following is a chronology of the U. S. Department of Agriculture blueberry breeding program, showing workers and results, from 1906 to 1958:

1908-1936—*Frederick V. Coville, Leader; Oliver M. Freeman, Assistant.* Grower Cooperators: Elizabeth C. White, Atlantic Company, and H. G. Huntington. B. C. Crabbe, Plant Collector.

1908-1909—Brooks and Russell selected in wild.

1911—First crosses.

1911—Sooy and Rubel selected in wild.

1920—First varieties named: Cabot, Pioneer, Katharine.

1926—Second varieties named: Greenfield, Rancocas.

1927—Blueberry - chromosome article published.

1928—Third varieties named: Jersey, Concord.

1936—Larger fruited varieties named: Weymouth, Dixi.

1938-1960—*Federal and States Cooperating.* George M. Darrow, Leader, 1938-1957; D. H. Scott, Leader, 1946-. Assistants: 1940-1942, H. E. Fischer; 1938-1945, E. M. Meader; 1946-1948, F. L. Goll; 1958-, R. J. Knight.

1940—Atlantic, Burlington, Pemberton, named.

1949-1955—"Big Six" named: Berkeley, Coville, Bluecrop, Earliblue, Herbert, Blueray

1950-1954—First canker-resistant series named: Wolcott, Murphy, Angola, Croatan.

1950—First two hybrid rabbiteye varieties named: Callaway, Coastal.

1955—Second set of rabbiteye varieties named: Homebell, Tifblue.

1958—Second set of rabbiteye varieties named: Garden Blue, Menditoo.

1959—Collins named.

Plant Collectors

J. M. Batchelor, 1938-1941

F. L. O'Rourke, 1941-1944

University Cooperators

W. H. Camp, 1940-1944

Experiment Station Cooperators

North Carolina:

E. B. Morrow, 1938-1956

G. W. Schneider, 1956-1958

Gene Galletta, 1959-

Georgia:

Otis Woodward, 1940-1945

W. T. Brightwell, 1945-

Florida:

R. H. Sharpe, 1949-

New Jersey:

J. H. Clarke, 1938-1945

F. A. Gilbert, 1948-1950

Gene Galletta, 1950-1953

J. N. Moore, 1956-

Massachusetts:

J. S. Bailey, 1946-

Maine:

E. P. Eggert, 1954-1956

Leslie Whitten, 1956-

New Hampshire:

E. M. Meader, 1948-

Principal Grower Cooperators

North Carolina:

J. M. Batchelor, 1947-

Gale Harrison, 1941-

G. Love, 1950-1958

H. C. Huntington, 1931-1950

New Jersey:

Atlantic Company, Lester Collins, 1940-1946

Atlantic Company, Galletta Brothers, 1947-

H. B. Scammell, 1938-

Connecticut:

Sayre B. Rose, 1946-

Massachusetts:

J. H. Alexander, 1946-

Michigan:

A. C. Elliott, 1947-

References for Additional Reading

Camp, W. H. The North American Blueberries. *Brittonia* 5: 203-275. 1945.

Coville, F. V. Experiments in blueberry culture. *U. S. Bur. Plant. Ind. Bul.* 193: 1-89. 1910.

———. Improving the wild blueberry. *Yearbook, U.S.D.A.* 1937. 559-574.

Darrow, G. M. Blueberry growing. *U.S.D.A. Farmers' Bul.* 1951. 1957.

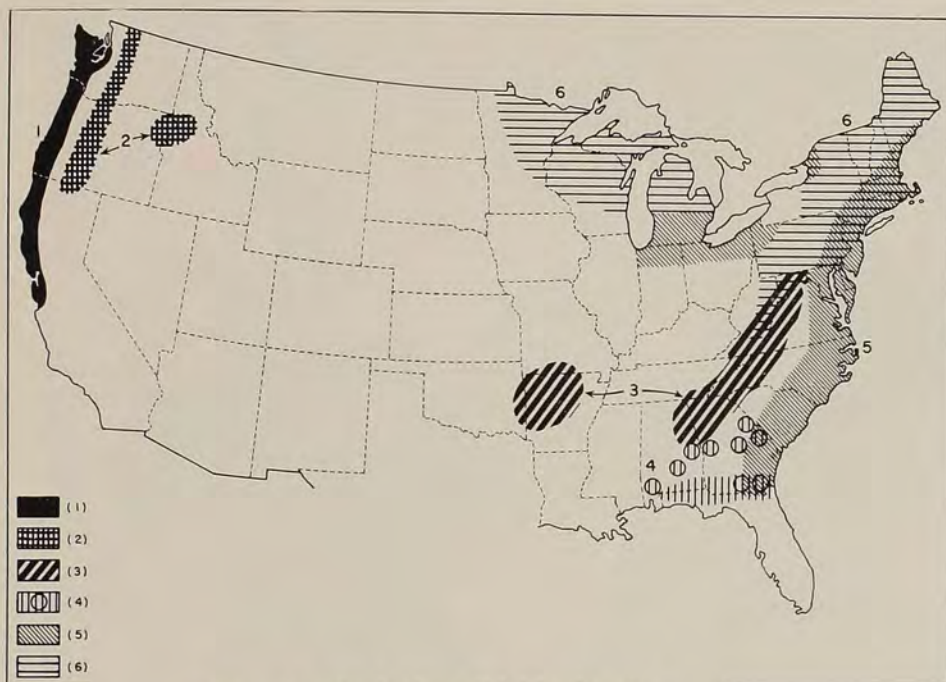
———, W. H. Camp, H. E. Fischer, and Haig Dermen. Chromosome numbers in *Vaccinium* and related groups. *Bul. Torrey Bot. Club.* 71: 498-516. 1944.

———, and W. H. Camp. *Vaccinium* hybrids and the development of new horticultural material. *Bul. Torrey Bot. Club.* 72: 1-21. 1945.

———, E. B. Morrow, and D. H. Scott. An evaluation of interspecific blueberry crosses. *Proc. Amer. Soc. Hort. Sci.* 59: 277-282. 1952.

———, D. H. Scott, and Haig Dermen. Tetraploid blueberries from hexaploid \times diploid species crosses. *Proc. Amer. Soc. Hort. Sci.* 63: 266-270. 1954.

———, Otis Woodard, and E. B. Morrow. Improvement of the rabbiteye blueberry. *Proc. Amer. Soc. Hort. Sci.* 45: 275-279. 1947.



U.S.D.A.

Areas in which the wild blueberries
are extensively harvested in the United States.

- (1) *Vaccinium ovatum*
Evergreen Blueberry
Box Blueberry
- (2) *Vaccinium membranaceum*
Mountain Blueberry
- (3) *Vaccinium pallidum*
Dryland Blueberry
Low Blueberry
- (4) *Vaccinium ashei*
Rabbiteye Blueberry
- (5) *Vaccinium australe*
Highbush Blueberry
Vaccinium corymbosum
Highbush Blueberry
- (6) *Vaccinium lamarchi*
Lowbush Blueberry



Cluster of Blueberry blueberries.

U.S.D.A.



U.S.D.A.

***Vaccinium corymbosum* 'Brooks'**

*These clusters of blueberries are from Brooks, the very first selection Dr. Coville made in 1908-1909 from the wild species growing in his native State of New Hampshire. Brooks and a selection of *Vaccinium lamarcki*, which he named Russell, and which was made at the same time and from the same location, were the parents used to obtain most of the present varieties.*



U.S.D.A.

Clusters of Pioneer Blueberries

*Pioneer, Cabot, and Katharine, were the first three hybrids named in 1920 from Dr. Coville's breeding. Pioneer is a hybrid of Brooks (a wild selection of *Vaccinium corymbosum*) and Sooy (a wild selection of *Vaccinium australe*). Although Pioneer produces blueberries of high flavor, it is being replaced by larger, hardier, and still better flavored varieties.*



*A field of the native tetraploid lowbush blueberry, *Vaccinium lamarcki*, with a heavy crop.*

A highbush \times lowbush seedling (Russell \times Brooks) resulting from Dr. Coville's first crosses.

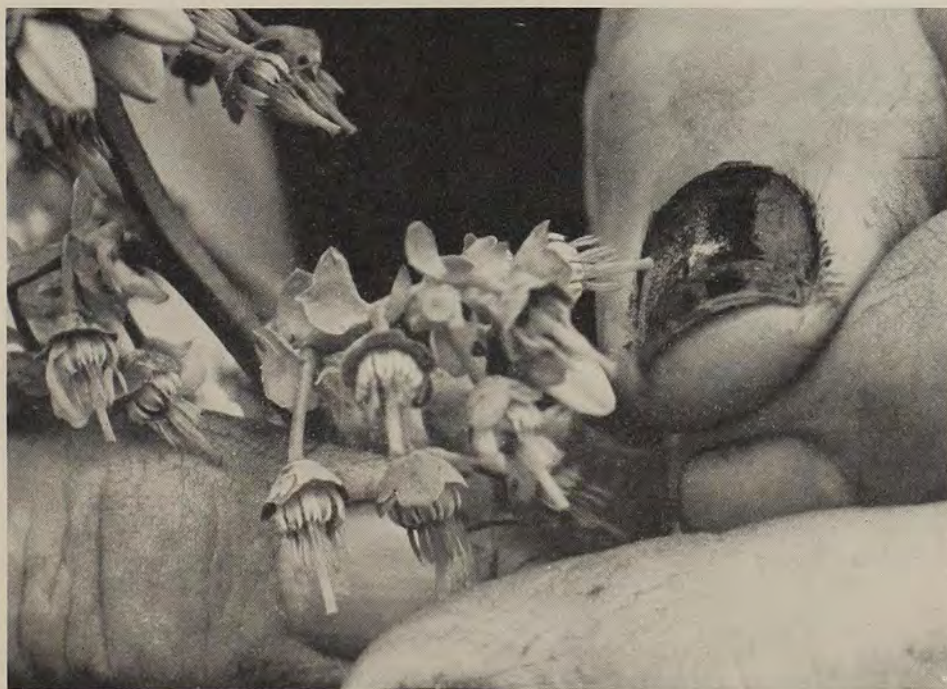




U.S.D.A.

Picking ripe berries of the Earliblue variety, the earliest of the "Big Six" hybrids.

Under controlled hybridizing conditions, pollen is shaken from anthers onto a red-coated thumb nail, then touched to the stigmas of receptive flowers.



U.S.D.A.



New varieties with **dry scars** (where the berry separates from the stem) are desired; even superior to that of the berry shown above (left). Such berries would keep far longer than those with wet scars (right).

New varieties should be **non-dropping** for cheaper harvesting. Earliblue (right cluster), a non-dropping newer variety, contains much of this characteristic, as compared to the widely planted Weymouth variety (left).

*Blueberry mites have destroyed most of the berries in the clusters shown below. The stem canker (at pencil point) has done much damage to the Cabot variety illustrated. Resistant varieties have largely replaced the older varieties in the South, but greater **stem canker and berry mite resistant** varieties are still needed.*



U.S.D.A.



U.S.D.A.



U.S.D.A.

Desirable traits in wild selections of diploid (*Vaccinium atrococcum*, right) and tetraploid (*Vaccinium australe*, left) species might be combined in producing better commercial varieties, if colchicine treatments could **double the chromosome** number of *V. atrococcum* to make cross possible.

The underbrush of this burned over area in the Cascade Mountains is *Vaccinium membranaceum*, the largest fruited species of a group closely related to the cluster-fruited blueberries. It bears its berries singly and is the most, or one of the most, drought-resistant species, producing its large, highly flavored fruit after four to six months without rain and even when the grass has turned brown and become dry from lack of water. This **drought resistant** species may be hybridized with cultivated varieties to produce an outstanding commercial variety for the West Coast area.



U.S.D.A.



Vaccinium ovatum, the Evergreen Huckleberry of florists, native along the West Coast, could be used in breeding to obtain **larger size berries**.

The vigor of the Rabbiteye Blueberry, *Vaccinium ashei*, is shown by this illustration of a bush about 30 years old in west Florida. Full grown bushes have averaged over fifty quarts. **Vigor and productiveness** are desirable qualities in breeding new plants. M. A. Sapp, shown here, transplanted his first blueberries about 1890 from the wild, and was probably the first successful blueberry grower in the U. S.





Decoratively carved fruits of the Common Calabash.

See Maracas Note on Page 40

The Calabash Trees

EDWIN A. MENNINGER

Perhaps the most fantastic of trees grown in south Florida are the three different kinds of calabashes. They are unusual in their forms, foliages, flowers and fruits. The trees are anything but pretty, and one's first impression is that here at last is a tree that does not look like any other tree. When orchid fanciers find out that calabash trees make excellent perches for all kinds of air plants, perhaps they will come into commoner cultivation, although they are seldom seen now.

The calabashes belong to the BIGNONIACEAE, along with the Jacaranda,

the African Tulip, the Flame Vine, and the Tabebuias. This is difficult for the layman to understand at first because the fruit is not a long pod that splits, but a berry that does not. The seeds, instead of being papery and winged, are hard, almond-shaped, and buried in pulp inside the fruit. Years ago botanists assembled the calabashes and some fourteen other genera in a separate family they called CRESCENTIACEAE; in it they put the sausage-tree (*Kigelia*), the candle tree (*Parmentiera*), and others that had similar fruits with hard seeds imbedded in the pulp. Later this entire group was



*The growth habit and hanging fruits of the
Common Calabash*

Crescentia cujete

moved into the Bignonia Family, but still kept separate as a "tribe," because, undoubtedly, all of them have funnel-shaped flowers like the rest of the Bignonias.

The one thing about the calabashes that really attracts attention is the gourd-like fruit. In Mexico and elsewhere these are carved and decorated, sometimes extravagantly. They are used as musical instruments and as kitchen utensils of many kinds. They are sold in the markets and many of them find their way back to this country as souvenirs.

For a better understanding of these strange trees, this paper presents a description of the three kinds growing in Florida: the Common Calabash, the Mexican Calabash, and the Black Calabash.

The Common Calabash

Crescentia cujete L. (Syn. *Crescentia acuminata* H.B.K.; *Crescentia fasciculata* Miers.; *Crescentia cuneiflora* Gardn.)

The common calabash tree, sometimes planted in Florida gardens as an orna-

mental, is one of five species of *Crescentia* found in tropical America. Its curious fruits astonished the Spanish explorers of the New World, reminding them of the gourds they had known in Spain, and they promptly called them *Calabazo*. Seeds were carried around the world and the calabash tree today grows in tropical lands everywhere.

Rarely as high as thirty feet, the calabash has a short, thick trunk and a spreading, somewhat depressed crown. The dark green leaves are in clusters of five, narrowly spatulate, somewhat wider in the upper half with a sharp point, the lower half tapering to the base. The unattractively distorted, bell-shaped, dull greenish purple flowers, sometimes intermixed with red and yellow, are borne usually on the old wood; frequently all over the trunk. They have a disagreeable odor. They are followed by huge green fruits that vary greatly in size and shape. Usually the fruits are oval, but sometimes globular or even flattened like a pumpkin. Standley reported that in Central America they

reach a maximum diameter of twelve inches. J. H. Balfour in *The Treasury of Botany* went a lot farther when he wrote: "*C. cujete* . . . [with] gourd-like fruits two feet in diameter have been seen in West Africa. A large calabash can support two men in crossing a river." There is no record of any such fruits in Tropical America.

Standley, in *Flora of Costa Rica*, wrote: "One wonders at first how a tree can support such a load of fruits, that suggest pumpkins, although they are green rather than yellow. The shells of the fruits have been of great importance in household economy since the earliest human settlements, for they are used almost universally in Mexico and Central America for making cups, bottles, and all sorts of kitchen utensils. The cups, particularly those formerly used and still so employed in some localities for drinking chocolate, often are ornamented with intricate designs, and such cups must have been one of the first noteworthy articles to greet the eyes of Spanish explorers."

The same author in *Trees and Shrubs of Mexico* wrote: "The hard shell of the fruit, which resembles a gourd, has been used in Mexico from ancient times for making 'jicaras' or drinking cups, which are often ornamented by carving and painting. Vessels thus made are sufficiently substantial for moderate use over fire."

A. Smith in *The Treasury of Botany* wrote: ". . . even kettles being made of [the fruits] [and] . . . standing fire several times before they are destroyed."

The wood of the calabash tree is brownish, often streaked with a darker color; moderately heavy, strong and pliant, with a coarse texture suggestive of elm (*Ulmus*). It is not durable and is obtainable only in narrow widths, but it finds use in the manufacture of small tools, etc. There is extensive literature on the medicinal usefulness of the fruit, pulp, seeds and other parts of the tree.

The Mexican Calabash

Crescentia alata H.B.K. (Syn. *Crescentia trifolia* Blanco; *Otophora para-doxa* Blume; *Parmentiera alata* Miers.)

This calabash is commonest along the west coast of Mexico, often in pure

stands near the sea and it attracts more attention to its leaves than it does to its fruit. Though usually small, the trees occasionally reach forty feet or more, with long thin trunks and widespreading branches without thorns.

The leaves are in groups of three. The two outside leaves are simple, without stalks, and smaller. The middle leaf has a long, broadly winged petiole with three leaflets at the tip forming a cross, and this striking form is responsible for the common name for the tree in many countries where it is cultivated.

The gourd-like fruits are about the size, shape and color of an orange, too small to be used for most utensils, though occasionally they are made into drinking cups or more frequently, into musical instruments. Often these are highly carved before the shell gets dry.

The typical Bignoneaceous flowers are about two inches long, borne singly on the trunk, brownish or purplish, and have a vile odor.

The earliest account of this tree and of the common calabash (*C. cujete*) was given by Oviedo and quoted in Standley's *Trees and Shrubs of Mexico* as follows:

"The *Higuero* is a large tree like the mulberry trees of Castile. It is a kind of calabash, round or somewhat elongate; and the round ones are very round, of which the Indians make cups or other vessels, for drinking. The wood is strong and good for chairs and other purposes. It is flexible and strong, and when worked resembles in grain pomegranate or hawthorn. The leaf of this tree is long and narrow, and the widest part is at the tip, from which it narrows to the base where it is attached, as I sketch it here. In times of scarcity the Indians eat this fruit. I refer to the interior—which is like a green calabash. When dried and the interior removed, to make a vessel of the *higüera*, the vessel has a luster like a gourd, and indeed it is a gourd of the sort I have described. These fruits or calabashes are so large that the larger ones are like a water-jar that holds a gallon of water, and some are no larger than a closed fist; and thus they make of them vessels of the size that the dimensions permit. These trees are common in Hispaniola and all the islands of these Indies and in the Spanish Main. * * * I may state that the leaf of the *higüero* is



JULIA MORTON

The Mexican Calabash, Crescentia alata

The flowers come out singly on most any part of the trunk of the tree. When leaves appear, there are two little ones without stalks, and a middle leaf with a long stalk and three leaflets at the tip, forming a cross.



JULIA MORTON

The cross-shaped leaves and two flowers of Crescentia alata.

long and narrow, and the widest part is near the tip, from which it narrows to the base where it is attached, as I said above, and this is seen plainly in plate 3, figure 3. But there are other *higüeros* in Tierra-Firme which are different, not in the fruit or in any other particular I have mentioned, but only in the leaves, as shown in plate 3, figure 4, each leaf in the form of a cross, as I have drawn it; and this seems to me a very noteworthy thing, in which appears a testimony of the cross, a thing of which these people can not have been ignorant. These *higüero* trees, which have the leaves all formed like crosses, I have seen in the Province of Nicaragua, especially in Negrando, where lies the city of León, and in other parts of that country; and marveling upon the leaves, I gathered some to show in Spain, as I did show them, and I still have some in my possession. But in Nicaragua, where as I have said there are many of these trees, they call the tree *guacal*. The precious

vessels of the *higüeros* are found in Darién and in the Gulf of Urabá, with handles of gold, and so handsome that the most powerful king might drink from them without reproach. And these come through the channels of trade from the great river of San Juan, which empties into the Gulf of Urabá."

Many uses are found for the pulp and seed of the Mexican calabash. According to Antonio Membreño, Assistant Director of STICA, Tegucigalpa, Honduras, a popular "refresco" on special occasions such as birthdays is made of ripe seeds of the Mexican calabash, ground with raw rice and roasted pumpkin seeds, lemon peel, strained and mixed with sugar, water and ice.

In parts of Honduras, calabash seeds are collected from the fallen fruits and fed to cattle during the dry season when fodder is scarce.

Likewise many medicinal uses are reported.



JULIA MORTON

The Black Calabash, *Enallagma latifolia*

Growing as a shrub of about fifteen feet, this illustration shows the dense, heavy evergreen foliage. The Black Calabash usually reaches the tree height of about thirty-five feet.



Close-up view of leaves and flowers of the Black Calabash.

The Black Calabash

Enallagma latifolia (Mill.) Small.
(Syn. *Crescentia latifolia* Mill.; *Crescentia curcurbitina* L.; *Enallagma curcurbitina* Baill.)

Although four species of *Enallagma* have been described from the West Indies and Central America, this is the only one known in Florida where it is indigenous to rich, moist areas near salt water in the vicinity of Biscayne Bay, northward. It has been reported from the West Indies, southern Mexico, Trinidad, Central America, and Venezuela.

Frequently the Black Calabash is only a shrub ten to fifteen feet tall with very dense, heavy evergreen foliage. The broad leaves are placed singly and alter-

nately on the stem, and vary widely in shape. More frequently it becomes a tree to thirty-five feet with smooth or shallowly fissured bark. The branches hang down to make a well-rounded head.

The flowers, produced on the trunk or old wood of the branches and usually quite hidden by the foliage, are lop-sided tubes about an inch and a half long, purplish or yellowish, and not pretty. The smooth fruits up to three inches in diameter, may be round or egg-shaped, and when dry their woody shell is very brittle. There is just a suggestion of four ribs on the outside of the shell. The numerous compressed seeds are buried in the pulp inside. Several medicinal uses for the pulp are reported by Gro-sourdy.

Maracas contain only a few hard seeds (and these are not calabash seeds) to make the rattle so indispensable in Latin orchestras accenting their rhythms. They are always operated in pairs—one moved forward while the other is moved back to the body. The small pair, shown in the illustration on Page 34, are garishly painted red and blue. The large pair at the top of the illustration, is ornamented with carving only. The "adorno" is merely an ornament for hanging, but the lid can be slid up on the cords to make room for placing objects in the bottom part so that it can be used as a container or carrying "basket."

Lenten Roses in the Southeast

BROOKS E. WIGGINTON*

A. E. Luedy's article on the species of *Helleborus*, which appeared in the January 1959 issue of *The National Horticultural Magazine*, helps to increase the printed information on this interesting genus. To it, the writer would like to add some notes gathered from twelve years' experience in growing *Helleborus orientalis*, the Lenten Rose, in the Piedmont section of Georgia.

In this area, the first flowers of the Lenten Rose appear in early January, but, as the name implies, this is primarily a flower of the late winter and very early spring. It makes a good show of color for about two months through February and March. Although it is attractive for its floral display, the chief beauty of the plant may be its foliage which is reliably evergreen and extraordinarily rich and handsome in appearance.

Culture of the Lenten Rose

All general articles on the Lenten Rose direct that these plants should be located in shaded areas. This seems to be the major requirement for success in this area. The writer has observed native growths of the plant in Italy in the foothills of the Apennines, near Rome, where it inhabits wooded glades covered with deciduous trees. One can do no better, as a first step, than to try to duplicate this environment in planning new plantings.

Good drainage is the second essential consideration. Most growers recommend ample water and a humid atmosphere. But, if a generous mulch is allowed to accumulate over the soil, the plants bear up without extra watering through the Georgia summers characterized by long periods of drought and high temperatures. In the years of the writer's present plantings, there has never been any artificial irrigation between mid-June and mid-September. This is a period of at least semi-dormancy during which no special care is needed.

Soil preparation to a depth of about twelve inches is helpful, without doubt, in obtaining best results with the Lenten Rose. The roots penetrate deeply into the soil and they must be able to do this to survive dry periods. Heavy clays are improved by the addition of sand and humus while sandy soils require fortifying with the latter. In general, these plants are said to be lovers of alkaline soil, but the plants in the writer's garden have thrived in the acid Georgia clay under a mulch of oak leaves. Many growers classify these plants as "gross feeders," and recommend annual top dressings of manure composts. Where heavy flower production is the objective, this prescription is probably helpful; but, where a relatively permanent and maintenance-free effect is desired, the gentler sustenance is perfectly adequate coming from the decomposition of the natural accumulation of leaves and litter.

Choosing a good site, giving attention to soil preparation, and building a

*Mr. Wigginton, formerly connected with the staff of the Department of Landscape Architecture at the University of Georgia, is now in private practice at Wheeling, West Virginia.

mulch are the simple essentials in the culture of the Lenten Rose. There remains little else to consider. At the end of the flowering period, about mid-March, it may be advisable to cut off the bloom stalks except those one wishes to save for seed. This practice conserves the energy of the parent plant, removes growth which later turns brown and unsightly, and forestalls volunteer seedlings which can become a nuisance.

There have appeared no insect or disease pests in the Georgia plantings. The Hellebores, as a group, are said to be subjected rarely to a disease causing brown spots on the leaves and, also, to a sort of wilt, shriveling and blackening the foliage and stems. Both of these conditions are said to be controlled easily by sanitary precautions or by sprays of a Bordeaux mixture. On one or two occasions there appeared in my plantings an injury which bore a resemblance to that caused by the wilt fungus, and, in order to prevent further troubles, all affected portions were cut out with some care. There has been no subsequent recurrence of this damage. It is difficult to state whether the plants were suffering from an attack of wilt or the injury was due to cold. The blackened parts appeared in early spring on new growth which, if it is caught by a severe nip, can be frozen back.

However demanding the plants may appear in the "books," the Lenten Rose is one of the most easily grown of all perennials. It may require no cultivation, weeding, spraying, pruning, feeding, or watering if they are located in a spot to their liking, and they will maintain themselves for many years.

Hardiness and adaptability

On the basis of these growing observations, it may be concluded that the Lenten Rose is well adapted in a belt of land extending from Baltimore and Washington to the Mississippi River, bounded on the north and west by the Blue Ridge Mountains, and on the east and south by the Southern Coastal Plain. A few trials made in the Coastal Plain itself have not been successful, whether because of the longer hot summers or the more sandy soils or both, it is difficult to say.

If the southern limit is pretty clearly

defined, the northern is not. The Lenten Rose hardly seems as well suited to colder climates as is apparently the Christmas Rose so often pictured blooming robustly in banks of snow. In Georgia its first flowering date is often followed by very cold periods. As long as temperatures do not fall much below twenty degrees, the blooms remain unhurt. During the winter of 1957-1958, however, there was a comparatively long time in January and February when temperatures lurked below ten degrees. During this unusual ordeal, all new growth was frozen to the ground. This diminished the total floral production of the plants, but a good effect was produced later on when the cold seemed to have left no after effects. Where such low temperatures are the rule rather than the exception, however, it may be doubted whether a really satisfactory floral display is ever attained under outdoor conditions.

Botany of the Lenten Rose

The source of the plants in the writer's collection was a handful of volunteer seedlings presented by Mrs. Arthur Harris, Sr., of Atlanta, who had secured a number of named varieties from a grower in Oregon. To this original stock have been added numerous selections from hundreds of their seedling progeny raised to maturity through the succeeding years. The names of the parent plants have long since been lost, but, even if these were known, it would be impossible to determine the ancestry of the seedlings. Still, it has been a matter of some interest to the writer to decide whether these plants should be called *Helleborus orientalis* or some cultivated variety therefrom.

While the gardening encyclopedias generally list a number of species and varieties of *Helleborus*, the question of identification is not new. In an article in the *Gardeners' Chronicle* of London in 1877, F. G. Baker presented the genus in a simplified scheme of six species. Of these, three bear their flowers on leafy stems (*H. vesicarius*, *H. lividus*, and *H. foetidus*) and three on stems which rise directly from the root (*H. niger*, *H. viridis*, and *H. orientalis*). Of the latter three, the well-known *H. niger* is identified by the fact that only one blossom oc-

curs on a stem (or two in the variety *altifolius*). *H. viridis* is separated from *H. orientalis* by the character of its leaves; the former being thin and deciduous, while in the latter they are thick, leathery, and evergreen.

Within the *H. orientalis* species, Dr. Baker recognized nine variations in four color groups: (1) sepals white, (2) sepals white with green, (3) sepals green, (4) sepals purple. He noted further that these "varieties" came from a number of localities in southern and western Europe, and that at least one (*H. atrorubens*) "is completely a link between the *orientalis* and *viridis* groups."

Dr. Baker's effort apparently aimed at simplifying one of those complex, almost infinitely graded series of variations not at all uncommon in certain genera. It seems not to have met with universal approval, however, for in another article in the same periodical of 1879, T. Moore maintains that *Helleborus orientalis* should be treated as a group of separate species. Thereupon he lists twenty-five species and named varieties of which sixteen are purple flowered, six are white, and three are green.

To most gardeners such matters are rather remote. Still the problem of the proper naming of plant materials is of practical significance to one who is trying to find a certain kind of plant for a certain purpose. In view of the polyglot ancestry of the plants in the writer's garden, to say nothing of the matter of identification which has apparently eluded clear definition by scholars for a long time, there seems to be nothing left but to call all of these plants, with their wide variety in flower color and form, Lenten Rose or *Helleborus orientalis*. The variations observed in this seedling mixture may be grouped as follows:

I. Flowers White

- a. Sepals pure white, green-tinged at base, broad formed, overlapping.
- b. Sepals pure white, no green, narrow and not overlapping, marked in the throat with thin lines of olive brown.
- c. Sepals pure white, similar in form to the above, marked in the throat with thin lines of crimson.

II. Flowers Rose to Purple

- a. Sepals almost white to greenish, dusted with rose dots to give a pinkish effect.

- b. Sepals greenish, shading to rose on the outside edges.
- c. Sepals deep rose of uniform intensity.
- d. Sepals rose on outside and white or creamy inside.
- e. Sepals broad, overlapping, rosy purple with blue bloom and bluish vein markings.

III. Flowers Green.

These variations seem to recall most of the flower characteristics listed in earlier descriptions, but to try to separate them into their proper categories would be a difficult, if not highly unrealistic, task. It might be profitable to propagate vegetatively and to name a few of the most outstanding individuals such as one in this series which produces both single and double blossoms, slightly frilled, greenish in color overlaid with rose.

Uses for the Lenten Rose

The Lenten Rose is fairly satisfying as a cut flower. It is not very showy but, coming at a dull season, it does make a welcome material for arrangements. The stems of the flowers ought to be deeply immersed in water and they should be kept cool to last. Since the flowers nod on their stems, floating the individual blossoms in a flat bowl to show off their color has some advantages.

As a potted plant, the Lenten Rose may be transplanted from the open in autumn and gently forced into bloom for a long-continuing display through the earliest months of the year. This procedure is sometimes suggested for *H. niger*, but *H. orientalis* appears to be even more amenable to transplanting and handling.

The chief use of this species must be in the garden where it serves handsomely in shaded spots as a ground cover. For outdoor culture it appears to be ideally suited to a broad section of the upper South as well as the Pacific Northwest. It provides a foliage pattern of incomparable richness throughout the year, and this is embellished by a shy but lovely floral display throughout two months of a season when there is little other color in the garden. From a plant so long-enduring and requiring so little care, one could hardly ask more.

A Book or Two

Exotica 2

Pictorial Cyclopedic of Indoor Plants

Alfred Byrd Graf. Roehrs Company, Rutherford, New Jersey, 1959. 1,146 pages. 7,600 illustrations, 231 plants in color. \$25.00. Special price to AHS members, \$22.50.

Exotica is a comprehensive and contemporary pictorial record of plants known to American horticulture, and cultivated for the enjoyment of their decorative qualities, strange foliage, or attractive inflorescence, in home, conservatory, or sheltered patio.

The object of this work of reference is to acquaint friends of horticulture with the vast variety of interesting, decorative plants which may be used indoors, and also to provide a visual and simple means of identification and classification.

The first edition of *Exotica*, released in 1957, contained 644 pages, impressive and valuable enough at the time for anyone to own. The pages in the new edition have increased to a whopping 1,146. These were necessary to present the additional illustrations of more than two thousand varieties of plants (now more than 6,900 plants are portrayed, with 231 plants pictured in full color) and seven hundred other illustrations, line drawings, and maps.

Printed words are provided to deal with: plants in the house (also 57 illustrations are used), methods of propagation (fully explained with text and 36 illustrations), glossary of botanical terms (also pictured), insect enemies of house plants, and the general characteristics of plant families, with the main genera of the families illustrated (118 genera—in line drawings).

The main pictorial section follows the above, consuming almost nine hundred pages. The plant families are arranged in alphabetical order, then the genera in each family are also arranged in alphabetical order. The majority of the families are discussed in greater detail at the beginning of each family. The next hundred and thirty or so pages are given over to a description of the plants pictured; these being in alphabetical order by the genera and species. There is a good bibliography, a rather longish and illustrated discussion of world plant geography, a common names index (some 3,000 listings), and a scientific names index of the plants illustrated.

The first and second end papers contain, as did the first edition, a C. S. Hammond world map, with the tropic belts emphasized, since this area, about 3,200 miles wide, is home to most of the exotic plants used for indoor deco-

ratings. The third end paper has the summarized culture data on potted plants. These summaries are coded and the coded information is referred to in the genera and species descriptions. These data are given in English, Spanish, German, and French. The fourth end paper reproduces the botanical terms illustrated from the main text.

The efficiency expert and the plant taxonomist have two separate views on "order"; the former blank-mindedly sees order in the A-B-C storage of data, to be recalled with one search; the latter stores his in a relationship order, requiring knowledge before his search. Imagine, then, this being the only criticism the reviewer has to offer on the cyclopedia: Wanting to see an illustration of *Aspidistra elatior*, the e.e. has to consult the scientific names index on page 1129 to find it located on page 694: while the learned mind knows automatically that *Aspidistra* is a member of LILIACEAE, and he can immediately find the Lily Family (this being in alphabetical order) then leaf over to *Aspidistra* (this also being in alphabetical order within the family).

On the other hand (and Mr. Graf planned the cyclopedia this way) such a long search is good. The e.e. soon learns patience, and this is one of the greatest of rewards to the gardener. Along the way he also learns more of the overall foundation of the plant kingdom by learning why various genera are related and why a group of genera belongs to a certain family—this being the ultimate purpose of the illustrated educational venture.

The American Horticultural Society can think of no other single title it would like to have in the hands of all its members, and it strongly and very sincerely hopes that every member who possibly can will purchase a copy in 1960.

JOHN MARSHALL

The Garden Flowers of China

H. L. Li. The Ronald Press Company, 15 East Twenty-sixth Street, New York 10, New York. 1959. 248 pages. Illustrated. \$6.50. (Library).

The author tells the story of the more important flowers and plants in Chinese gardens and their association with the Chinese people throughout past history. An attempt is made to combine legendary background, historical data, and botanical review, utilizing original Chinese literature, both ancient and recent; also, publications in Japanese and the western languages have been employed. For those interested in pursuing this subject further, there is a very complete bibliography at the end of each chapter.

(Books available **for loan** to the Membership are designated: (Library). Those not so designated are in private collections and are not available for loan. Books available **for sale** to the Membership are designated with the special reduced price and are subject to the usual change of price without notice. Orders must be sent through the American Horticultural Society accompanied by the proper payment. Please allow two to three weeks for delivery. Those not designated for sale to the Membership at reduced prices can be purchased through the Society, however, at the retail prices given. In these instances the full profit is received by the Society to be used for increased services and benefits of the Membership.)

The ancient legends about the use of even the more common and well known plants, plus their historical backgrounds, make this book interesting reading for the layman, while the rather detailed botanical descriptions found in most of the chapters should be of interest to the more advanced student.

The illustrations are beautiful examples of the ancient Chinese art of painting on porcelain, pottery, silk, and paper. There are about fifty line drawings of the plants described, copied from the Chinese artists of the twelfth century; and thirty-two engravings representing artists of the twelfth through the seventeenth centuries. One series of half-tones pictures twelve bowls "Flowers of the Twelve Months," each having a timely flower enameled on the porcelain.

This book is No. 19 in the *Chronica Botanica: An International Biological and Agricultural Series*, Frans Verdoorn, Consulting Editor. Dr. Li is taxonomist of the Morris Arboretum and associate professor of botany at the University of Pennsylvania. He has published many technical papers on botany and horticulture and is the author of *Chinese Flower Arrangement*.

W. W. W.

Landscaping With Vines

Frances Howard. The Macmillan Company, 60 Fifth Avenue, New York 11, New York. 1959. 240 pages. Illustrated. \$6.50. (Library). AHS Members' Price \$5.53.

With the interest gardeners are taking now in the more unusual plant selection and in greater variation in approach to landscaping, particularly in the use of choice vines, this book is successfully appropriate. Some three hundred vines are discussed in adequate detail. Included are some of the vines which seldom receive attention even in the most widely recommended book, for example, *Stauntonia hexaphylla*. The twenty-eight half-tone engravings used are from an early issue of *The National Horticultural Magazine* and they represent the same number of species of the rarer vines. Thomas O'Connor has prepared line drawings for forty-six other plates, and these represent forty-two other species, plus one of *Akebia quinata*, also shown in half-tone, and three of gourds, leaf outlines, and methods of climbing. The front end paper has a hardiness zone map of the United States and Canada.

Each entity is listed in alphabetical arrangement by species and is thoroughly considered from the aspect of landscape uses, habit, flower, fruit, growth rate, climate, and special requirements for growth (soil, location, pruning, support, fertilizing, watering, insects, diseases, etc.).

Tables of vines, according to their uses and of approximate hardiness range, make this book very useful. It is in this area, however, that the reviewer believes the author writes on the conservative side: *Fatsyhedera lizei*, listed as only suitable in the Gulf and similar regions, can actually be grown in the Washington, D. C., area. This is also true of *Stauntonia* which has taken temperatures down to zero without conspicuous damage. These are very minor points

and do not detract from the overall well-rounded presentation of the subject.

Mrs. Howard, a garden consultant, designer, and horticultural writer, has written two other books: *How to Grow Fuchsias* (1953) and *Ornamental Trees* (1955). C.

Design for Flower Arrangers

Dorothy W. Riester. D. Van Nostrand Company, Inc., 120 Alexander Street, Princeton, New Jersey, 1959. 184 pages. Illustrated. \$7.50. (Library). AHS Members Price \$6.38.

The principle of design—the placement of visual symbols in orderly, rhythmic pattern, pleasing to the eye—is manifested in all forms of the fine arts—in house building, the molding of clay, the printed cloth as well as the printed page and even wallpaper, in paintings, and above all in Nature itself. Mrs. Riester, a sculptor, draws from all these sources to explain and to show the flower arranger that essentially the same principle of design must be applied with the vases and the cut plants.

The author divides her thoughts into creative approach to design, materials of flower arranging, design analysis of materials, reality and use of space, vision in motion, the form emerges, and a critical evaluation. There is a short list of workshop suggestions at the end of each chapter. Nearly each page has an illustration, either an interesting photograph or a line drawing which is explained in the text.

The critical evaluation section is possibly an area which might be dangerous to the beginner in flower arranging. For, although Mrs. Riester says a judge must be able to see and to experience the form as a whole, she says that she feels that a judge need not necessarily be an arranger. This is not in keeping with the policies of the National Council of State Garden Clubs which gives flower show schools in the various states to encourage flower arrangers to later become judges. The Council produces more judges, from the flower arranging schools, than any other organization in the U. S.

F. P.-K.

Atlas of Plant Morphology

Emma L. Fisk and W. F. Millington. Burgess Publishing Company, 426 South Sixth Street, Minneapolis 15, Minnesota. 1959. 60 pages. Illustrated. \$3.00. (Library).

Portfolio I, Photomicrographs of root, stem and leaf, contains (sixty loose-leaf pages punched for a three-ring binder) 172 original photomicrographic reproductions of vegetative structures of vascular plants. It is designed for use as a teaching aid in courses in plant anatomy and morphology and is meant to supplement the direct study of this material under the microscope. It is a collection of excellent microscopic illustrations.

A planned Portfolio II will deal with the reproductive structures of vascular plants as seen under the microscope.

Common Fleishy Fungi

Clyde M. Christensen. Burgess Publishing Company, 426 South Sixth Street, Minneapolis 15, Minnesota. Second Printing, 1959. 258 pages. Illustrated. \$3.00. (Library).

Some acquaintances with the fleshy, nonmicroscopic (and mostly pathogenic) fungi is important—often essential—to gardeners, lawnmakers, and nature-walkers. Thus, it is if they look at other than green plants and want to know what the specimens they see really are.

For specialists and students there is a fairly adequate array of descriptive books on these fungi, but gardeners and nature lovers who are not mycologists have long been in need of understandable descriptions of such organisms. Access to simple sketches that illustrate the basic structure and the details on which the identification of species may depend is also important. Dr. Christensen's handbook for this purpose, and designed primarily for amateurs in this study, is an important contribution to this need. It provides keys to identification, *supplemented by sketches*, for the recognition of the principal kinds of fleshy fungi, together with detailed descriptions for identifying their species. It covers nearly two hundred and fifty kinds of common gilled fungi and about a hundred and fifty of other kinds of fleshy fungi—about all that gardeners often see and need to know. A glossary of descriptive terms and a list of helpful references to the entire subject are included. The covers are of heavy paper and the loose-leaf pages are bound with a spiral wire.

F. A. W.

Camellia Culture

E. C. Tourje, Editor. The Macmillan Company, 60 Fifth Avenue, New York 11, New York. 1958. 484 pages. Illustrated. \$11.50. (Library). (Not discounted to AHS Members.)

This is a very valuable book on one of America's favorite flowering shrubs—the Camellia. The book is divided into nine main sections, each of which is devoted to a major area of concern for this plant. Each section in turn has several chapters to cover that main topic. The fifty-five authors, serving under the general editorship of Mr. Tourje, are of many fields and interests, yet all hold much interest in the Camellias. They are amateur, professional, and scientific workers with the Camellia and their experiences brings much authority to their writings. There is some overlapping and repetition of information, which must be expected from fifty-six viewpoints, and there is some disagreement.

No special section is devoted specifically to the several species and many varieties, as to their color groups, growth habits, hardiness or similar groupings. Many varieties are mentioned in the several chapters but not as an evaluation. The reviewer believes this would be very desirable for many readers.

C. B. L.

The Book of Landscape Design

H. Stuart Orloff and Henry B. Raymore. M. Barrows and Company, Inc., 425 Park Avenue, South, New York 16, New York. 1959. 316 pages. Illustrated. \$3.95. (Library).

A collection of the authors' lectures on landscaping expanded to include a brief but concise history of gardening, the emergence of the profession of landscape architecture and the relation of the landscape architect to his client.

Since most of the book deals with a detailed discussion of theory, elements and principles of design, it will probably be of more value as a teaching aid than as a practical manual for the individual home owner. Sparsely illustrated.

CARL N. JOHNSON

Popular Styles of Japanese Flower Arrangement

Lida Webb. Hearthside Press, Inc., 118 East Twenty-eighth Street, New York 16, New York. 1959. 128 pages. Illustrated. \$2.95. (Library). AHS Members Price \$2.51.

Mrs. Webb has written one of the best books on the art of arranging flowers in the Japanese manner. It is filled with much needed information on the various styles and she has correlated this information offered by different masters. The many forms of Ikebana are discussed and explained in details and the book is liberally illustrated with fine line drawings showing not only the various forms within a form, but also the different placements necessary to attain that form.

The Morimono, Ikenobo, Moribana, Heika, Nageire, and the Modern Japanese Free-style arrangements are also discussed and illustrated. There is a chapter on judging Japanese-style arrangements, although the author makes it clear that in Japan NO arrangement is ever judged. The dictionary and pronunciation guide at the end of the book are interesting. There is also a list of references which will appeal to the dedicated arranger. A good inexpensive gift for yourself or favorite arranger.

F. P.-K.

Your Lawn

How to make it and keep it

R. Milton Carleton. D. Van Nostrand Company, Inc., 120 Alexander Street, Princeton, New Jersey. 1959. 165 pages. Illustrated. \$3.95. (Library). AHS Members Price \$3.36.

Dr. Carleton is a horticultural researcher and garden writer known from coast to coast. What he has to say in this book is based on the most recent tested methods to come from scientific research—and much of the helpful, practical information in this book was unknown as recently as ten years ago.

Plant Propagation

Principles and Practices

Hudson T. Hartmann and Dale E. Kester. Prentice-Hall, Inc., 70 Fifth Avenue, New York 11, New York. 1959. 559 pages. Illustrated. \$7.95. (Library). AHS Members Price \$6.98.

This is an excellent text giving encyclopedic coverage of the theoretical aspects, as well as the practical techniques, for the propagation of higher plant life. In organizing the book, the authors have first discussed the basic fundamentals of each phase of plant propagation and in related chapters they have discussed the application of these fundamentals—thus giving the reader a very comprehensive view of either phase of the subject.

The text begins with the basic essentials of propagation—the nature of propagation, an analysis of structures and equipment; goes into propagation by seedage; then, to the vegetative means of propagation. The last section of the book covers the propagation of specific, economically important plants—one chapter being given for fruit and nut crops; one, the woody ornamental shrubs and trees; and, one the annual and herbaceous perennials. Included in these chapters are nearly fifty of the world's important fruit and nut crops and a hundred of the major ornamentals. The latest and most important new developments in plant propagation are given throughout the text.

There are over two hundred illustrations carefully selected and reproduced to show, in most cases, step-by-step methods of how to perform the various techniques. Extensive references to experimental work and a large bibliography make the text of added value to the serious and professional workers in this field.

This is the best textbook available on the subject of plant propagation and it is highly recommended that all members of the Society purchase a copy if they possibly can.

Doctors Hartmann and Kester, both plant physiologists, are on the teaching staff of the University of California and are well known to many of our readers through their works in leading professional and popular magazines.

C. B. L.

Plant Patents

Common Introductory Names 1 through 1542

Written and published by the American Association of Nurserymen, Inc., 635 Southern Building, Washington 5, D. C. 1957. 52 pages. \$2.50. (Library).

This booklet is a directory of all the plant patents granted since No. 1, The New Dawn Rose, August 18, 1931, and with two supplements brings the data up through Plant Patent No. 1791, December 30, 1958. The first listing is in a numerical sequence; this gives also the plant concerned, the date the patent was granted, the originator or the discoverer, the assignee, and the common name of the plant. Another section gives the alphabetical listing by plants; and under these generic names, it gives the common name or the patented name.

The Highway and the Landscape

W. Brewster Snow, Editor. Rutgers University Press, New Brunswick, New Jersey. 1959. Illustrated. \$5.00.

This book is the first devoted to the relationship between the highway and the landscape. The construction of the largest highway building program the world has ever seen stimulated its conception.

Written by experts and specialists in engineering, landscape architecture, and horticulture, it is authoritative and presents a wide scope of approaches to the central problem of the subject; namely, the reasons why the roadside and the landscape will determine the success or failure of this enormous road building program to which the United States is now committed.

As one of the contributors writes: "Highway economy now is understood to consist not in constructing the greatest length of pavement at the least capital cost, but rather in creating a public utility that possesses a total and permanent community value." "Planners have learned over the years that the safest and most efficient highways are also the best looking," says the editor.

The first three chapters of this volume are devoted to the historical facts which serve as the background and experience-basis for the present day "complete highway." They trace the development of the modern limited access freeway from the first of its kind, the Bronx River Parkway in New York. Fortunately, those whose vision and dedication made the Bronx River Parkway possible were available to prepare much of this historical record. It reads like an exciting piece of fiction, and as a part of the American heritage it is of interest to anyone concerned today with highway transportation.

Chapters devoted to The Art of Fitting the Highway to the Landscape, Preserving the Scenic Qualities of the Roadside, Good Highway Design is Economical, The New Highways and Property Values, The Functional Uses of Plants on the Complete Highway, Zoning for Roadside Protection, and Politics and Road Building, indicate the broad scope of the book.

Throughout the book, the values of plants to the safety of the highway are stressed; that the riding public today also demand a utility that preserves the natural beauty of the countryside and requires the restoration of beauty when destroyed by the construction process, is likewise called to the reader's attention in many ways and by several of the contributors.

The book is illustrated by halftones and line drawings which add to its overall value. The authors throughout support the view so well expressed by Gilmore D. Clarke of Clarke & Rapauno in the final words of his contribution, "From my forty years of experience in the design and construction of motorways, I firmly believe that every element introduced into the design of the expressway or the parkway that improves its appearance, also improves efficiency and safety." This publication should stimulate more attention to the proper roadside development along lines that some have been urging for many years.

R. P. W.

Garden Ideas and Projects

Richard D. Whittemore, Editor. Doubleday & Company, Inc., 575 Madison Avenue, New York 22, New York. 1959. 532 pages. Illustrated. \$3.95. (Library).

This book is a compilation of information brought together from the pages of *Home Garden Magazine*, now incorporated with *Flower Grower*. The first four sections are devoted to projects which are designed to make gardening a more sanitary and well-planned program. It is well illustrated with line drawings and scale figures of all sorts of neat garden devices: tool racks, benches, fences, various kinds of walks, and similar use of materials. For this purpose it is a useful text. A fifth section is devoted to common garden mistakes and I suppose most of us need such reminders. In any event, there are five hundred mistakes listed and described with the particular remedy for each.

Mistake: jamming the roots of shrubs into a hole too small. Remedy: using a larger hole. Many other similar practical points are discussed.

From there the book goes into the very popular year around garden calendar, with what to do and when to do it for various parts of the country and ends up with a pronouncing dictionary of plant names. Thus, the reader from the south wishing to properly refer to a widely used plant will find it under the proper phonetic spelling, "Kam-mell-ee-uh." For the first sections alone, this is a handy book for a working library but it will probably not become a collector's item.

C.

Growing Flowers

John H. Tobe. Tobe's Seeds, Limited, Saint Catharines, Ontario, Canada. 1956. 367 pages. \$5.00. (Library).

Mr. Tobe writes almost four hundred short stories about his gardening, nature, people, etc., for pure entertainment. He is a well known nurseryman and publishes an unusual garden paper.

Our Friend the Forest

Patricia Lauber. Doubleday & Company, Inc., 75 Madison Avenue, New York 22, New York. 1959. 64 pages. Illustrated (by Anne Marie Jauss). \$2.00.

An illustrated, conservatory story of what makes a forest, how a tree grows, how the forest is a friend of man and how man should be a friend of the forest. The author, editor-in-chief of *Science World* magazine, and the illustrator, also an author of several children's books, have combined their talents to present this timely book for the younger reader.

Succulent Plants other than Cacti

A. Bertrand. (English text edited by Vera Higgins.) Philosophical Library, Inc., 15 East Fortieth Street, New York 16, New York. Second Edition, Revised. 1959. 120 pages. Illustrated. \$6.00. (Library).

Dr. W. H. Hodge, in reviewing the First Edition (1953) of this title, wrote: "This little volume can almost pass as an introductory guide to the principal groups of succulents. The amateur interested in this group of plants will find in the first three chapters, brief notes on the geographical distribution and native habitats of succulent plants, how they may best be grown, and what their enemies are. In the remaining eight chapters one is introduced to the important plant families represented, including that of the agaves, the lilies, milkweed, stonecrops, euphorbias, and the 'mesembs.'"

The Second Edition covers the same ground with a few revisions in the text but has all new color and monochrome illustrations.

Garden Irises

L. F. Randolph, Editor. American Iris Society, 2237 Tower Grove Boulevard, Saint Louis 10, Missouri. 1959. 575 pages. Illustrated. \$7.95. (Library).

With thirty-three chapters presenting the principal features and most of the details relating to irises, opening with history, covering propagation and culture, including structural features and classification, and closing with breeding, exhibition, and photography, irises are honored indeed.

The contributors of this manifold information include the prominent leaders of iris societies—national and state in this country, and some in England, specialists in iris breeding and culture here and abroad, and many of the prominent students who are still developing the factors of science as well as horticulture in relation to irises.

Thirty-two chapters, with over a hundred topical headings, contributed by fifty-two iris specialists constitute the text. There are also appendixes providing an Alphabetic Finding-list of Iris Species Names, Pronunciation of Iris Species Names, Check-list of Iris Species Hybrids, Chromosome Numbers of Iris Species, and Chromosome Numbers of Iris Varieties.

Of particular interest, aside from the details of garden culture of irises and maintaining them in health, are the chapters on Crossability of the Major Groups of Iris Species (Katherine Heinig), Chromosomes of Iris Species (L. F. Randolph and Jygotirmay Mitra), Chromosomes of Garden Varieties of Bearded Irish (L. F. Randolph), and Iris Genetics (Randolph and A. H. Sturtevant).

An outstanding horticultural compilation that will be welcomed by all iris growers.

F. A. W.

Flowering Gift Plants

Their care and how to rebloom them
G. M. Fosler. University of Illinois, Agricultural Information Office, 110 Mumford Hall, Urbana, Illinois. Circular 801. 56 pages. 43 illustrations. Fifteen cents a copy (Single copies free to residents of Illinois).

This is a very well done circular—it is ideal in furnishing the answers to the perennial question of how to take care of gift plants. It deals with those plants usually received—amaryllis, azalea, begonia, chrysanthemum, Easter lily, gardenia, and some other eighteen plants. If you write for this title, (and please write to the University of Illinois), also ask for *An Easy Method for Germinating Flower Seeds, plus seed storage hints* (Circular 796) and *Soil Sterilization Methods for the Indoor Gardener* (Circular 793). These two were also prepared by Dr. Fosler, and they are free.

Food

The Yearbook of Agriculture, 1959

Alfred Stefferud, Editor. U. S. Department of Agriculture, Washington 25, D. C. (Available from U. S. Government Printing Office, Washington 25, D. C.). 1959. 736 pages. Illustrated. \$2.25. (Library).

The Lily Yearbook

of the North American Lily Society,

Number Eleven, 1958

Number Twelve, 1959

George L. Slate, Editor. North American Lily Society, 21 Oakland Street, Lexington 73, Massachusetts. 1958/1959. 128/192 pages. Illustrated. \$4.00 each (including membership). (Library).

Editor Slate has added two more valuable Lily Yearbooks to the annals of horticulture, recording the status of the lily for 1958 and 1959.

Number Eleven contains helpful results on the lily fleck control and lily root rot control; many articles on experiences in selecting species and hybrids, as well as their successful growth and flowering. Other papers deal with specific regional reports; pay tribute to the lost members; and record annual events of meetings, awards, etc. There are four important reports on propagation: The role of the cotyledon in germination of lily seeds; Some wrinkles on scaling; Hybridizing, anyone?; and Lily breeding notes.

Number Twelve, reflecting the increased interest in lilies, is somewhat larger than usual, but follows the usual format and same high quality as set by the Editor in past issues. There are technical papers, reports, and the like in this issue, but there is much more data on how to grow more species. Gibberellins enter into the picture with a good report from Boyce Thompson Institute for Plant Research.

General Botany Laboratory Manual

John W. Hall. Fifth Printing, 1958. 215 pages. Illustrated. \$3.50.

Laboratory Workbook

In Introductory Botany

Wendell H. Camp. Third Edition, 1959. 120 pages. Illustrated. \$4.00.

Both are published by Burgess Publishing Company, 426 South Sixth Street, Minneapolis 15, Minnesota.

Gardeners and non-professional horticulturists whose botanical education was acquired some years ago, or did not extend beyond one general course, often find need for an up-to-date and not too technical botanical review.

Although botanical textbooks are essential to students and very useful in extensive garden libraries, they may prove a bit costly and oversized for the work library of the practical gardener (except, of course, the textbook of his own one-time course—perhaps now out of date).

For the gardener's much used library it is possible to obtain inexpensive laboratory manuals designed for students. They contain descriptions of various plants and structures, are generously illustrated and well provided with keys to identify plants used in laboratory studies, and because they are revised frequently, are up-to-date in the science of plant genetics and chemistry. They provide much of the information that gardeners may need, can be useful in work gatherings of garden clubs, may even coax the junior members of families to seek broader interest in botany and be better prepared for such study when they reach college.

F. A. W.

Herbs

How to grow them and how to use them

Helen Noyes Webster. Charles T. Branford Company, 69 Union Street, Newton Centre 59, Massachusetts. Revised Edition and Sixth Printing. 1959. 204 pages. Illustrated. \$3.50. (Library). AHS Members Price \$2.98.

Mrs. Webster published this title as a pamphlet in 1933 under the auspices of the Massachusetts Horticultural Society. It has enjoyed almost continued success as is evidenced by the steady stream of revisions, editions, and printings, and the dignification of engravings and cloth coverings.

Each reissue has added new experiences from Mrs. Webster's own garden and research, as well as shared experiences of friends, most of whom have been very active in the formation and administration of the Herb Society of America. It is a standard work on herbs, their lore, culture, and everyday uses.

In this Sixth Printing, a supplement has been included, posthumously. "Fragrant and Bitter Herbs of the Bible," rounds out the coverage of the original text, at the wishes of the author, and was prepared mainly from notes left by her.

The Gardeners' Pocketbook



FROM A WATER COLOR DRAWING OF G. A. C. HERKLOTS

Mucuna bennetti

Ornamental Species of *Mucuna*

This genus *Mucuna* has been neglected by the horticulturist. This is a mistake because it contains some of the showiest of the climbing plants of the tropics. *Mucuna* is the Brazilian name for a twining plant and quite appropriately has been selected as the name for this genus in the LEGUMINOSAE. Probably the main reason for its unpopularity is that the woody seed pods of many of the species are densely covered with golden hairs which break off at the slightest touch penetrating the skin where they cause very unpleasant irritation. The best known is the Cowitch or Cowage, *Mucuna pruriens*, which is wild in the West Indies; a harmless variety free from hairs is the Florida Velvet Bean, a useful fodder plant.

The genus, containing more than thirty-five species, occurs in the tropics and sub-tropics of both the Old and New Worlds. In Hong Kong there are two species with dull purple flowers and one, *M. birdwoodiana*, with long racemes of large ivory-white flowers which are followed in due course by long woody pods. This species grows in ravines and well-watered wooded valleys where even in the dry season the roots never suffer from water shortage. The common species in Trinidad is *M. sloanei*, locally known as Donkey Eye, because of the supposed resemblance of the large black seeds, to the eyes of donkeys. The buds of this species are borne in a cluster of eight to ten at the end of a hanging stalk several inches long. They are pale yellow tipped with red. On opening the flowers discolor quickly so the plant is more showy when in bud than when in full flower. This species flowers in November and December.

Mucuna rostrata is a native of tropical South America, said also to be wild in Trinidad though I have never found it

there. It is at its best at Christmas when it is extremely beautiful. In this species the flowers are in whorls of three towards the end of a hanging inflorescence which may be nine inches long. There may be fifteen, eighteen or even twenty-one flowers, orange-scarlet or flame-colored. As each flower is almost three inches long and in appearance rather like an enormous sweet-pea flower the climber when covered with inflorescences is very showy. It does best if its roots are allowed to grow into a swampy piece of ground for it requires a lot of water; it also needs plenty of light and heat if it is to flower freely. A high trellis or a pergola would provide a suitable support. The specific name *rostrata* means beaked and this refers to the keel of the flower which is curved below and tapers to a sharp point. A *rostrum*, incidentally, is a platform from which orators make speeches and the *rostrum* in the Roman forum was adorned with the beaks of captured war-galleys. Seeds are not normally set freely but if the keel of a newly opened flower is pressed downwards the anthers of the stamens are freed and shoot out on either side of the beak, together with the style and stigma, and there is a good chance of some of the pollen adhering to the stigma. If one hundred flowers are popped in this manner perhaps five will set pods each containing two or three seeds.

Beautiful as is *M. rostrata*, the species from New Guinea are at least as impressive. One of these, *M. bennetti*, has the reputation of being the most showy of all tropical climbers and the story is that a special expedition was sent to New Guinea with the express object of collecting seeds. Seeds were received in Singapore in 1940 and plants were grown at the Botanic Gardens where I saw the first plant in flower some years ago. The plants in Singapore set no seeds, or very few, but plants taken to Penang set seed more satisfactorily. From this source I received five seeds in Trinidad in 1954 of which three grew. In 1957 one of these plants bore at least one thousand flowers open together, a wonderful sight admired by many visitors. In this species the flowers are as long but perhaps not as heavy as those of *M. rostrata* but are produced in even greater abundance. I counted sixty-two flowers on one hang-



FROM A WATER COLOR DRAWING OF G. A. C. HERKLOTS

Mucuna sloanei

The commonly grown species in Trinidad is known as "Donkey Eye" there because of the supposed resemblance of the large black seeds, $1 \times \frac{7}{8} \times \frac{3}{4}$ inch, to the eyes of the donkeys.

ing inflorescence. This species flowers at different times of the year and usually more than once a year.

A colleague, N. W. Simmonds, who visited New Guinea on a banana-collecting expedition, was asked to keep his eyes open for *Mucuna*. He saw many plants in flower in the wild in late 1954 and early 1955. Some at least tolerated if not enjoyed swampy conditions as besides the river Sepik and in the Mekeo flats of Papua. There they cover large trees up to seventy feet in height and make a really wonderful show of scarlet flowers. All fruit very sparingly and both Simmonds and J. S. Womersley, botanist of the Forest Department, were unable to find any seeds. Subsequently as a result of intensive search by gangs of assistants a few seeds of each of two species were found and sent to Trinidad in 1955 and 1956. The first of these, *M. novaguineensis*, flowered for the first time in 1957; the flowers were of a deeper and brighter red than those of *M. bennetti* and more slender, about three inches long and borne in very large clusters. Since 1957 it has flowered sparingly but is not as reliable in the open as *M. bennetti*. It also likes plenty of water round its roots. *M. albertisi*, the second species, is not as vigorous a plant and has not yet flowered in Trinidad. There are about a dozen more species recorded from New Guinea but probably few if any of these are in cultivation in gardens in the tropics or in hot houses in temperate countries.

All these species may be propagated by cuttings of ripened wood treated with root-hormone solution and kept in a propagating frame for some weeks; or they may be ringed, treated with hormone, wrapped with damp moss and enclosed in polyethylene when they will root freely. *Mucuna* seeds are often picked up on the beach in Trinidad; some may have been carried there in flotsam down the Orinoco. On a trip by river to the Angel Falls in Venezuela, I frequently found *Mucuna* seeds on the banks of the tributary of a tributary of the Orinoco River up which I was traveling.

G. A. C. HERKLOTS, *The Imperial College of Tropical Agriculture, Trinidad, British West Indies.*

Notes on Two Heath Plants

Fetterbush

Tarflower

Scattered in great profusion on the banks of streams, in swamps, and on wet flatwoods on the southern coastal plain is a broadleaf evergreen shrub that most certainly should be in cultivation as an ornamental. This plant is *Lyonia lucida*, often called the fetterbush. The flowers are urceolate to bell shaped and appear in April strung along the lower side of the arching branches. The growth habit is very similar to the Leucothoes and the leaves, though smaller, are an attractive, shiny, leathery green. The plant is very noticeable when in bloom because of the flower colors. There is quite a range, within the species, from white to rose pink, almost red.

Lyonia is easy to transplant to the garden and judging from the range of soil conditions in its natural habitats, it is tolerant of a wide range of placements in cultivation. For example, it is common in poorly drained semi-swamps where its associates are *Rubus* species, *Viburnum nudum*, *Persea borbonia*, *Rhus vernix* and *Magnolia virginiana*. Here the soils are black near the surface with organic matter and strongly acid. Again it can be seen growing on what appears to be excessively drained acid sands in company with *Quercus geminata*, *Q. cinerea*, *Q. chapmani* and some *Vaccinium* species. It also grows naturally in full sun and rather heavy shade. The natural range of the fetterbush is recorded as coastal plain Virginia, Carolinas, Georgia, Florida, Mississippi, and Louisiana. Ultimate height of this fine broadleaf evergreen is said to be about six feet.

Befaria racemosa, the tarflower, is an unusual heath with six or seven petals in its flowers instead of the usual five for its relatives. Flower colors range from white to pinkish tones and the writer has seen plants eight feet tall in the central Florida flatwoods.

This befaria is an evergreen with hairy twigs and seems to have strayed northward from the other *Befaria* species of

South America. I have seen it in profusion in peninsular Florida but not in Georgia, where it is also native. The blooms occur in summer on current wood so pruning for density can be done during the dormant season. My specimen, which has been in a container for several years, has grown very slowly but it blooms on schedule every year. Selected plants of the tarflower have considerable ornamental value but further testing is needed to determine its drought resistance and how readily it may be propagated by stem cuttage.—E. J. HORDER, *Mobile, Alabama*.

Tulbaghia violacea

Although the more commonly grown species, *Tulbaghia cepacea*, more frequently met in catalogues as *T. fragrans*, has led a more or less indifferent life in the garden here for many years, increasing slowly and giving usually more than one crop of flowers each year, we had never tried the larger and more strong growing species. All the scattered notes that could be found did not suggest that it would be happy, as it was plainly indicated as being evergreen and winter-flowering. A bargain offer of bulbs, however, overcame discretion and the roots were bought.

As they arrived after our first frosts, they were potted and kept in the cold greenhouse, the idea being that when spring came, they would make their escape. That was two years ago. They are still in their pot in the greenhouse.

The bulbs are long and necky, so that one is tempted to plant them with a portion of the neck out; so we did, and not having another pot with deep planting, it is impossible to tell if we were wise or wrong. Growth of foliage is more or less continuous here, with no marked period of resting, though in July and August there are no new leaves showing up in the fascicle. Now in mid-November scapes are coming up in every bulb bearing their tightly packed heads of rosy lavender blooms. In a way the plant does suggest that of *Agapanthus*, but only in slight degree. The leaves are broad and strap-shaped, the scapes do clear the foliage, the flowers are in a

comparable head, but the blooms are "urn-shaped" not starry and definitely pinkish as opposed to the clear lavenders and blue grays of *Agapanthus*.

A fellow member of the Society who lives in Biloxi assures me that he knows a garden there in which this winters safely outside, but he does not realize, perhaps, how much more mild the climate is there than here, inland a bit and colder even than the gardens on the beach front.

Whether to throw caution to the winds and put them out, in the spring of course, is a problem, that is still subject to procrastination.

Here, neither plant has shown any tendency to make seed, though insects visit them freely, even the pot in the greenhouse. The common sort can be divided easily enough, but so far, the subject of this note has not shown any sign of increase by off sets. But as a "minor" bulb, the plant is worth a trial outside, in the East, as presumably it would accept the wet-dry climate of the Pacific Coast without a murmur.—

B. Y. M., *Pass Christian, Mississippi*

Our Native False Aloe

Years ago a farm woman asked me to identify plants she had brought into her garden from the wild. They were trim rosettes of succulent looking green, so decorative that she wanted them in her garden. They had never bloomed during the several years she had grown them, but she thought they must be orchids because they differed so much from other local vegetation. I knew they were not orchids but had no idea what they were. After diligent hunting around I found a colony growing on a hot dry bank, lifted a plant, and moved it into my garden where I planted it beside yucca on the hot, dry, sunny south side of a building in a space where theretofore nothing except yucca had showed any enthusiasm for growing. Next year it flowered and was easily identified as false aloe.

The false aloe, *Manfreda virginica* or *Agave virginica*, is reported to be native as far north as Maryland, southern Ohio, and southern Indiana. For twenty-five

years my plant has made a rosette of growth about a foot across. It looked exactly the same from year to year, never any offshoots or side growth of any sort. So few plants remain over the years as they were when planted, that this seems a point much in the species' favor. Farther south, of course, where it is not so close to the northern limit of its range, it may grow more exuberantly. I have no data about that. This year the plant is puny and not symmetrical, whether because of age or other factor is not apparent. A seedling some fifteen feet away is now twelve years old. Its rosette is larger than that of its parent, perhaps eighteen inches across, but it, too, remains uniform in size from year to year. During very mild winters the foliage lives over here, but usually not.

The flowers are borne on a single wand like scape five or six feet tall. They are a nondescript greenish purplish color of no landscape value. They are, though, deliciously scented with a spicy fragrance that has been compared to mace. At flowering time the rosettes tend to lose their compactness. Growing conditions that will assure lack of bloom will increase the ornamental value of the plant. The farm woman whose plants had never bloomed was growing them in considerable shade which perhaps indicates that they bloom most freely in hot sunlight. MAUD R. JACOBS, *South Carrollton, Kentucky*

Byblis gigantea

Longwood Gardens has recently brought into flower one of West Australia's rarer carnivorous plants, *Byblis gigantea*, a perennial herbaceous species seldom seen in culture and apparently not grown before in this country. This species is a collector's item not only because of the interest generated by its carnivorous habit, but also for its very showy flowers. Unfortunately, seed is not readily obtained. Our supply was collected in the wild by George Spalding (P.I. 255034), as a result of the fourth Longwood Gardens-USDA exploration for native Australian plants of ornamental value conducted during 1958-1959.

In a land noted for its wealth of car-

nivorous plants, *Byblis* stands as one of two unusual endemic insectivorous genera, the other being *Cephalotus*. The exact systematic position of *Byblis* remains somewhat uncertain. Some botanists have considered it among the sundews (DROSERACEAE), others a congener of the bladderworts (LENTIBULARIACEAE), but latest opinion is that it belongs in a family of its own (BYBLIDACEAE).

Superficially the Australian plant resembles the better-known Portuguese Sundew,* *Drosophyllum lusitanicum*, which is presently growing together with *Byblis* at Longwood Gardens under identical greenhouse conditions. Not quite as tall, *Byblis* has similarly crowded alternate linear leaves. These tend to be yellowish-green in color and are covered with characteristic minute stalked glands which secrete a glistening mucilaginous substance attractive to small gnat-like insects which are effectively snared as on flypaper. A close look at *Byblis* shows that its leaves are softer and less rigid than those of *Drosophyllum* which differ also in developing like fern fronds (circinately); nor do the older leaves of *Byblis* become marcescent producing a skirt of dried leaves at the base of the stem at maturity. I can detect a rather strong honey-like aroma given off the glandular leaves of the Portuguese Sundew, but this is not noticeable in *Byblis*.

Both of these insectivorous species sport attractive flowers which are large in proportion to the size of the plant. In *Drosophyllum* the petals are bright sulphur yellow. Those of *Byblis*, which in our specimens average about 35 mm. in diameter, show various shades of rose-purple (petals RHS Imperial Purple 33/1, darkening to Violet-Purple 733 at their bases; stamens Lemon-Yellow 4/1).

Byblis gigantea is a native to the region around Perth in western Australia where the climate is of a frost-free Mediterranean type (with rainy winters and dry summers) very similar to that of southern California. Under natural conditions the species is recorded from "sandy swampy places" as well as "drier

*See *The National Horticultural Magazine*, October 1959, for "The Portuguese Sundew," and also herein for an illustration of its flower which blossomed after the manuscript for said note was received.—Ed.



G. HAMPFLE, LONGWOOD GARDENS

Drosophyllum lusitanicum

The Portuguese Sundew, described in the previous issue of the Magazine, has now flowered under greenhouse culture at Longwood Gardens, where the illustrated plant was photographed. The bright sulphur flowers are about the size of quarters.



W. H. HODGE

Byblis gigantea

*A closeup view showing the numerous mucilaginous glands on wild plant growing near Mogumber, West Australia. (Compare this with a similar one of *Drosophyllum lusitanicum* on Page 248 in the previous issue of the Magazine.) The details of the flower can be seen on the front cover.*

and better drained parts of such swamps." I have observed the plant in the field growing in moist but not swampy land near Mogumber (about fifty miles north of Perth) where it thrives in full sun on very sandy soil. There it associates with other typical West Australia plants such as the Cat's-Paw (*Anigozanthos humilis*). At the time, early spring (mid-September 1958), flowers were absent. These are produced in late October and November.

At Longwood Gardens, plants of *Byblis* are growing satisfactorily in pots on several types of media including pure ground sphagnum as well as several soil mixes all of which are on the sandy side. Seeds planted in mid-March of 1959 produced flowers four to five months later. Seedlings vary in flower color, some producing lighter shades than others. Flowers, borne on loose racemes, usually remain open for several days. Since a number (sometimes half a dozen or more) may be out on one plant at one time, they are very showy.

Byblis gigantea has proven difficult to transplant which suggests that a sphagnum medium is best suited to handling it since there is little root disturbance if plants require repotting. Plants under cultivation are not quite as robust nor is the foliage as strongly ascending as is to be seen in plants growing naturally in the field. Since many of the tiny glands on the leaves have an absorbent function, *Byblis* and *Drosophyllum* appear to be unusually susceptible to sprays used in greenhouses to control pests. Special care must therefore be given to assure that no toxic materials of this type reach the plants which might otherwise be killed.—W. H. HODGE, *Longwood Gardens, Kennett Square, Pennsylvania*

***Leucojum vernum* and**

***L. aestivum* Gravetye Giant**

These plants have been one of my conspicuous failures due sometimes to poor bulbs that failed at once, sometimes to a substitution of *Leucojum aestivum*, and sometimes to poor planting. Now,

Elizabeth Lawrence has been good enough to spare me some bulbs of her authentic stock. They have yet to decide if they mean to thrive here, so much further south than may be reasonable. So far only leaves have shown, but these at the proper time.

Whether or not they mean to establish themselves may not matter too much since the fine Gravetye Giant form of *L. aestivum* not only thrives here as would be expected, but has broken with its traditional time of blooming and comes ahead of season with recurring bloom over a period of almost two months. It never gave this long period in the North. Since it is so very much finer a plant than the type, it is lamentable that stock is not easily available in this country. The forms commonly seen in the old gardens here are all small flowered, and small flowered in the sense that they look starved, not just small. There is no virtue in size alone, the point is emphasized that the common type is a poor one, known unfortunately to most gardeners here as "snowdrops," a genus which has never been seen on the low levels of Coastal Plain gardening.—B. Y. M., *Pass Christian, Mississippi*

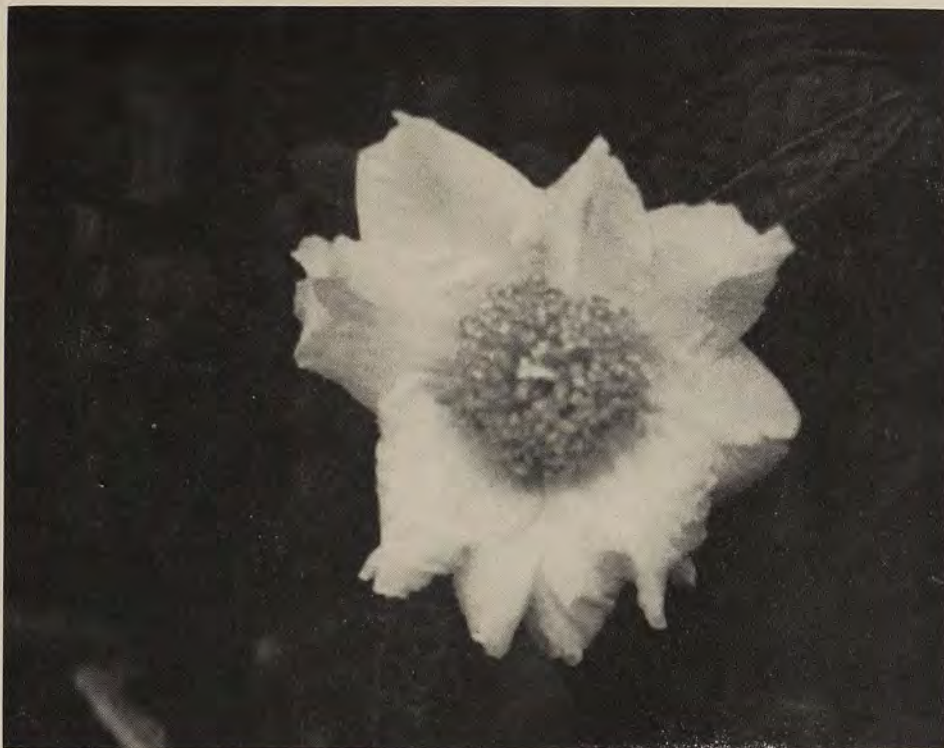
Camellia granthamiana

Another rare gift from China

The *American Camellia Year Book* 1956 had an article entitled "A new Camellia from Hong Kong" written by Ralph Dean, superintendent of the Hong Kong Botanical Gardens. The article aroused my curiosity as it said in part:

"It was with considerable surprise and pleasure that a distinct new species of *Camellia* was found last year in the Colony; especially so, as the flora has been examined by a succession of botanists and collectors since 1841.

"The discovery of this new species was made quite accidentally in October of last year [1955] by a Chinese forester who had from time to time sent us material collected on patrol duty. Amongst a miscellaneous collection he sent on this occasion was one specimen bearing a striking white flower, recalling at first sight a *Tucheria* or *Gordonia* but yet having seeds of a *Camellia*.



FREDERIC W. HEUTTE

Camellia granthamiana

ENGRAVING MADE FROM A KODACOLOR PRINT OF THE FIRST
FLOWER GROWN IN CULTIVATION IN THE EASTERN UNITED STATES

"The *Camellia* was subsequently found to be a new species. In a letter dated January 16, 1956, J. Robert Sealy of the Royal Botanic Gardens, Kew, England, advised us as follows:

"I have delayed replying to your letter of 20th December, 1955, until I could examine critically the material of the *Camellia* from Shing Mun. This has been done, and I have no hesitation in saying that the plant represents a very distinct new species. It seems almost incredible so distinct a plant, and with such large flowers should have remained undetected for so long, and then to be found growing in an area which is little more than three and a half miles north-west of Kowloon City.

"The new species has been named *Camellia Granthamiana* in honor of Sir Alexander Grantham, G.C.M.G., the president Governor of the Colony."

"This new *Camellia* bears handsome flowers which measure five and one-half inches in diameter and has eight white petals with a cluster of golden stamens in the center and is outstanding in the

genus by the following unusual characters: flowers without stalks, subtended by a large cup-like cluster of gray hairy perules (bracts and sepals), the white petals, slightly united at the base to the cluster of stamens, stamens free, the five-called seed capsules invested by persistent perules even when split, and the dark lustrous green leaves with deeply impressed venations on the upper surfaces.

"So far, only one plant, a small tree about twelve feet tall, has been found growing in partial shade on the edge of a woody area by the side of a rocky stream in company with *Ilex rotunda*, *Caesalpinia nuga*, *Adina pilulifera*, and tall grasses. On account of its multi-branched habit the tree is believed to have been cut to within a foot or so of the ground some years ago, and the base has a diameter of a little over twelve inches. Its age is difficult to determine but is probably between fifty and seventy years old.

"The area concerned is situated on the southeastern slope of Tai-mo Shan at an elevation of about two thousand

feet, leading up from the Shing Mun Reservoir. It is rather remote and is served only by a narrow track, a good one and a half hour's hike from the road. In the ordinary course of events it is certain that the spot is hardly ever visited, except by an occasional forester or villager. Probably the tree has hitherto been considered a *Gordonia*."

That concludes Mr. Dean's account of the plant and its discovery.

I was able to bring a flower of this new *Camellia* species to the Board of Directors' meeting of the American Horticultural Society in Washington, D. C., November 16, 1959. The late Ralph Peer, who has remained my counsellor over the years in trying to assemble for our Norfolk Park System a *Camellia* collection of note, in early 1957 offered to secure for me a scion of this new *Camellia*. Only he, I am sure, could have done it. In April of that year the precious cargo came to me in an airmail special delivery letter with a note from Ralph Dean enclosing a tip scion *about an inch long*.

I still remember to this day the thrill of seeing for the first time this gift from the Orient and how carefully we selected a stock plant [*Camellia japonica*] and how meticulously we placed the tiny scion for union, with a silent prayer. It took, and we watched it grow with fabulous rapidity unfurling leaf after leaf of its most attractive veined foliage. By June it was at least a foot high.

Then another chapter unfolded. A call from Robert Matthews, my assistant, who had shared with me the thrill of sparking life and growth in this tiny scion, announced that something had happened. *Camellia granthamiana* was broken off clear at the base union. A squirrel who frequents our propagating enclosure was named the culprit, but with no valid evidence. An emergency operation was performed immediately. The broken branches were carefully cut and the scion, now twelve inches long, cut in two. The most matured sections were placed on another stock plant, but this time, instead of using inverted jar system, both plants were placed under "intermittent mist," again with a silent prayer. The broken off, original scion soon emerged with basal buds and the twin graft took as if on schedule. This time a guard (hardware cloth) was used against Mr. Squirrel and other rodents.

By fall of 1957 both plants were about twelve inches high, the original with several shoots. During 1958 we carefully grafted three more plants and gave several scions away to our good and generous camellia friends. Unfortunately, although our three 1958 scions took, they did not survive the winter of 1958-1959. We had become brazen as a result of our original luck and I had decided from the beginning that *Camellia Granthamiana* should be hardy to our section. I now realize what a chance I took. Two winters, however, have proved that the new species will stand at least down to eleven degrees above zero, which was our recorded low for the two years, and happened in February 1958. Since then the low has been fourteen degrees above zero in January 1959.

In 1959 both plants put on a bud. The first on the original graft opened November 9. I took it to the Society's Meeting. The second bud opened on November 16, but the flower was killed by frost on November 18th when temperatures unseasonably dropped to twenty-five, a recorded low for that date. The weatherman had predicted only thirty. I was sure my new ward would take low temperatures with flying colors, so you can see that I am a ruthless gardener.

Now I can announce to the horticultural world that *Camellia granthamiana* is not only a beautiful flower but a rugged plant. Perhaps all plants are not so hardy. We cannot tell because to date only one plant has been found. But at least we are assured that the progeny of that plant, as mine have proved, are hardy, and what is more important, a real gift to our gardens.

Thanks to Messrs. Peer and Dean, and to C. P. Lau, who found the plant, Norfolk's new Botanical Garden has a notable first. This new plant came to us at just about the time we started work on this Garden, which we hope will soon take its place among the famous horticultural exhibits in America. It adjoins and is an extension of the Norfolk Municipal Garden which already has a notable collection of broad-leaved evergreens. Our new extension is planned to incorporate canals, so that the various plant collections and features can be viewed from electric powered boats.—FREDERIC W. HEUTTE, *Director, Norfolk Botanical Gardens, Norfolk, Virginia.*



FROM A WATER COLOR DRAWING OF G. A. C. HERKLOTS

Mucuna rostrata

SEE PAGE 50