DENVER BOTANIC GARDENS
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Denver Botanic Gardens maintains a collection of living plants, both native and exotic, for the purpose of acquiring, advancing and spreading botanical and horticultural knowledge.
THE COVER

Tomorrow's Horticulturists In the Conservatory

Photo by Loraine Yeatts

THE GREEN THUMB

VOL. TWENTY-NINE, NUMBER FOUR

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Copyright 1972 by Denver Botanic Gardens, Inc.
In the first six months of 1972 more than 8,100 children went on guided tours of the Boettcher Conservatory at Denver Botanic Gardens. Denver public schools sent 2,410 students; Jefferson County schools 3,140. There were 1,797 children from the schools of other counties, 501 from high schools, and 338 from parochial schools. All these visitors made their tours under the expert care of the 27 conservatory guides who each contributed an average of two hours a week to the job. It figures out that, on the average, each guide conducted over 300 children through the conservatory during the six-month period.
There aren’t enough guides to meet the demand.

In addition to the 8,100 school children who toured the conservatory, there were 1,600 more in adult garden groups, convention groups, and others, who were guided through the tropical wonders. Some groups, including scouts and the very young school children, as well as adults, made the tours without guides. There were over 3,100 of these people. By the middle of March the schedule for tours in late April and May (one group every hour) was booked solid. The record shows that 12,918 persons went on the scheduled tours during the first six months of this year. Thousands of others, not scheduled, visited the conservatory.

Volunteers who wish to become conservatory guides go through a six-week training course. In July, 16 new volunteers were attending classes taught by Mrs. Phil Hayward for two hours each week. Upon completion of the course the guides are expected to donate at least two hours a week to the conservatory tours. Those interested may get in touch with Mrs. Hayward, Syd Glick, or Margaret Sikes.

I was sure I never could learn all those Latin names! Even the common names of all those foreign tropicaIs surely would never come to mind if I had a staring horde of 10 or 12 year olds before me. No, I couldn’t possibly be a guide!

But, oh, here was someone actually willing to take me into the tropical wonderland and tell me about all those fascinating big-leaved plants and beautiful blooms! One tour through the conservatory and I was hooked; one training session and I was eager for next week to come so I could be introduced to yet another family from the plant kingdom and hear more details about the strange and often incredible inhabitants of the hot, wet quarters of our planet. Here was someone willing to initiate me into the wonders of plants bearing exotic fruits and fragrances, giving sustenance to natives of the jungle wilds, providing medicines and fibers, construction materials and even cosmetics!

I’m still sure I’ll never know most of those Latin names. The school children don’t care. When I show them a tree that grows in Australia to be over 200 feet tall and twelve feet across, their eyes widen with amazement. When I point out the pineapple-like plants and the orchids festooned on the tree trunks or point to the huge green fronds of the feather-palms, they are transported by magic to the depths of a tropical rain forest. When I describe the fierce battle between the tree-climbing fern and our little jelly palm, they feel sympathy for the barely surviving palm and perhaps realize more acutely that plants too compete to survive. I show them bananas, and even tomatoes that grow on trees. Perhaps the children go home feeling a little more of the diversity and wonder and excitement of the world of plants. Perhaps they become more attuned to an aspect of nature that most of them hardly considered before. It is a rewarding experience for me just to share an hour during which their worlds expand.
FOCUS on
Codiaeum variegatum
in the
Boettcher Memorial Conservatory

Peg Hayward

Codiaeum variegatum (L) Blume, originally from the South Sea Islands, is the scientific name for croton, an ornamental tropical shrub. The word “croton” is wrong botanically for it belongs to an entirely different group of plants of the same family, Euphorbiaceae. The genus Croton is the source of croton oil used medicinally, but of no particular garden value. Croton is from the Greek kroton for a tick, also a plant having tick-like seeds.

Codiaeums are favorite foliage plants with permanently colored leaves which are grown in warm, moist climates and valued for cultivation in greenhouses. Codiaeum is derived from the Greek word for head; the leaves were used for making wreaths. These woody shrubs may reach a height of 12 feet, but are usually kept much lower. The art of the hybridizer has given an ever-increasing number of varieties. The leaves have unlimited variations in form and in color pattern. Leaf blades may be either entire or lobed. Some varieties have long, narrow leaves while others are broad and laurel-like. Many leaves are smooth, others wrinkled, and some are twisted cork-screw fashion. All are thick, short stemmed and from 3 to 10 inches long. Leaves are strikingly mottled in brilliant colors ranging from green to yellow, orange-pink, red, maroon, or bronze. The color appears in spots, blotches, marginal colorings, and veins often show contrasting colors. Many crotons have young growth of one color that matures to quite another. Very seldom will two leaves on any plant be exactly alike. Crotons are sun-lovers and never show their best coloration in wet, shaded spots. When strongly shaded, the leaves turn green and may lose their colored patterns altogether.

Small monosexual flowers appear in axils of upper leaves in narrow spikes 6 to 10 inches long but are inconspicuous compared with the showy leaves. Male flowers near the top of the plant are white, each with 15 or more stamens. Female flowers below develop into small, globose, three-parted green fruits.

Codiaeum seeds do not come true, so propagation is by cuttings of half-ripened shoots under warm and close conditions. Substantial young plants may be secured from old specimens by air-layering well-colored tops.

Most of the many named varieties in cultivation are considered to have originated as seedling forms or sports of C. variegatum var. pictum (Lodd.) and are widely distributed throughout the tropics. Specialists have given fancy names to many of the more attractive varieties. Many “best ten” could be selected and the following are mentioned as just a few good examples: Lord Derby, large lobed leaves, yellow with bright red suffusion; Indian blanket, green, blotched with red and yellow; Bermuda red, with nearly all red smoothly pointed leaves; Mrs. Iceton, dark red with rose mottlings; and Masterpiece with twisted leaves in red, green and yellow. The bright colored foliage of the cultivated forms is conspicuous and plants massed in clumps make a dazzling exhibit.
Unique from its beginning...

BARTRAM'S GARDEN

Avalon Kosanke

"This is a very ancient garden, and the collection is large indeed... It is finely situated, as it partakes of every kind of soil, has a fine stream of water, and an artificial pond, where he has a good collection of aquatic plants. There is no situation in which plants or trees are found but that they may be propagated here in one that is similar." Thus did Reverend Manasse Cutler's JOURNAL describe the Bartram garden at Kingsessing, near Philadelphia, Pennsylvania, as it existed fifty-five years after it was begun. How much more ancient now! The collection is not so large, however, and intervening years have not always been kind to America's oldest existing botanic garden.

John Bartram had no intention of establishing a botanic garden. He was simply a farmer. In 1728, to provide for his rapidly growing family, he purchased at sheriff's sale 112½ acres of land sloping down to the Schuylkill River. An orchard and house came with the land. The orchard provided Bartram's favorite beverage, cider, and visitors today may examine the cider mill and press he carved from stone near the river's edge. The kitchen of the original house may still be seen as part of the handsome gray stone structure which Bartram built. Its datestone reads "John - Ann Bartram 1731."

Perfect Order and Regularity

His skill as stonemason is evidenced in many unusual uses of stone still visible in the seedhouse, also used as greenhouse, and other buildings. He wrote of this work to friends, "I have been used to making steps, door-sills and large window cases, all of stone, and pig troughs and water troughs. I have split rocks seventeen feet long and built four houses of hewn stone split out of the rock with my own hands."

Unusually perceptive of natural laws, Bartram farmed his land. With laborious care he poured back onto his fields the swamp muck, manure and other composts he concocted with such results that he regularly harvested more than thirty bushels of wheat per acre compared to his neighbors' ten. Other crops were similarly superior. By 1740 he owned nearly 300 acres. Crewecourt wrote of the farm, "Every disposition of the fields, fences and trees seemed to bear the marks of perfect order and regularity which in rural affairs, always indicates a prosperous industry."

Yet somehow his success as a farmer was never enough for John Bartram. He was born of Quaker parents at Darby, Penn., in 1699. He had learned the rudiments of reading, writing and arithmetic at the Friends' School in Darby. Beyond that he was self taught, a natural student, one driven by an insatiable curiosity, especially about plants. He wrote, "I had always since ten years old, a great inclination to plants, and knew all that I once observed, though not by their proper names, having no person nor books to instruct me." He bought what books he could afford and borrowed others on history, art, science, philosophy and several languages. He was drawn to "physic" and surgery, based largely at that time on medicines derived from herbs. This stimulated his interest in plants, and he frequently visited the medicinal herb garden of his friend, Christopher Witt, physician.

A Genius for Botany

This study of plants was further encouraged by James Logan, Secretary to William Penn. Logan was a serious student of plants and gardening. His library on this subject was one of the finest in the colonies. "Paradiso in Solei" written by John Parkinson in 1629, was one of many books he loaned to Bartram. In 1729 Logan wrote to an English friend, "Please procure me a Parkinson's Herbal; I shall make it a present to a person worthy of a heavier purse than fortune has yet allowed him. John Bartram has a genius perfectly well turned for botany."

True! The plants of his farm and neighboring lands were quickly known to him. Soon he was traveling by foot and by horseback into Maryland, New Jersey, New York and beyond. His saddlebags bulged with new and curious plants to be grown and observed in his garden at Kingsessing. Sometimes his sons went with him. Most often he traveled alone for the trips were strenuous. Once he covered 1100 miles in five weeks.

It was a costly, time consuming hobby. In his increasing absence much of the farm management fell to loyal servants. Such profitless endeavor was frowned upon by his wife, Ann Bartram.

John Bartram's House

'This photo and the photo on Page 119 are from the publication, "John Bartram, His Garden and His House"; by The John Bartram Association.'
How provident when Joseph Breitnall, a Philadelphia merchant, introduced Bartram by letter to the London merchant, Peter Collinson. Quaker Collinson had one consuming passion, his ornamental garden. He desired plants from the new world. Bartram was certainly qualified to supply them. Their cautious business agreement grew quickly into a reciprocal trading friendship that spanned thirty-five years and nearly doubled the number of ornamental plants grown in England.

More Honor Than Profit

Other wealthy patrons clamored for a share of the findings of this American botanist. At one time nearly fifty subscribed to the fund which made his searches almost self-supporting. Collinson's greatest coup for Bartram came in 1765 when he wrote, "This day I have received certain intelligence from our gracious king (George III) that he has appointed thee his botanist with a salary of 50 pounds a year." It proved more honor than profit since it required a horse which cost much while such mundane items as freight expenses for shipments remained ignored.

For years few ships left Delaware for England without a box from Bartram. Of his eleven children, William became most involved in care of the garden and making ready the shipments of seeds, roots and plants for patrons and the specially prepared specimens for study by European botanists, including Carolus Linnaeus. Almost from the beginning, the boxes included shells, turtles, frogs, rocks and similar objects since Collinson had written, "Every uncommon thing thou finds in any branch of nature will be acceptable."

Besides his stipend, Bartram received many things from Collinson: books on many subjects, fine wool cloth for Ann, advice, encouragement and requests. More exciting, however, was the endless stream of English and European seeds and plants to be tried in the Bartram garden. One box contained the roots of "Siberian shurbark," recently from Russia, with instructions how to prepare its stalks for eating. In 1743 came special pear seeds from former Patron Lord Petre's widow. Planted near the house, the famous Lady Petre pear tree took twenty years to bear fruit— but lived till the very dry summer of 1931!

Increased demands for new plants plus his own unabated curiosity beckoned Bartram on ever more arduous collecting trips. As the King's Botanist he undertook the exploration of Florida's east coast and St. John's River in 1765. His son, William, accompanied him on the eight month journey. Together they saw for the first time the famous and elusive Frankinia alatamaha. The trip was a fitting climax to his travels.

A Practical Garden

The garden at Kingsessing was unique from its beginning. America's 18th century gardens had not evolved into the colorful, strictly-for-pleasure borders of today. They were, like their times, more practical. They provided shade in lieu of air conditioning, food for the table, preserves for the pantry, herbs for the kitchen and medicine. Certainly Bartram's garden defied the rules and existed solely for the study and propagation of his treasured plants.

It boggles the imagination to picture the Bartram assemblage of things collected. It was easily the most extensive botanical collection in America, some "2000 native species contained in the space of six acres" as recorded by the Pennsylvania Horticultural Society. There were also rare foreign plants gathered from gardens around the world. Manassa stated there was no situation in which plants were found but that it might be duplicated in Bartram's garden. This was not happenstance. It proved his uncanny ability to observe accurately a plant's exposure, soil, light and moisture needs where it was gathered. The goal of his garden was to re-create these optimum growing conditions for each plant. This precluded growing them according to some formal plan, or even isolating them in botanically related groups. The germandering of ecologically similar plantings resulted in a disorderly order which few visitors could comprehend. It also discourages those who seek now to restore the garden.

During the American Revolution, with battlefields near at hand, it is to the credit of the British that though they occupied his house, they did nothing to destroy the garden around which he had centered his life. John Bartram's death came quietly in 1777 when the newly formed country was barely one year old.

William Bartram, by then a recognized artist, naturalist and botanist, continued the collecting and garden-nursery with the help of his own son, John. It was 1850 when the thirty-five acres which included the aging garden passed from the Bartram family control.

John Bartram Association

The twenty-seven acres which now comprise Bartram's Garden were purchased for a park by the City of Philadelphia in 1891. Two years later about 400 of his descendents formed the John Bartram Association "which maintained an interest in the care of the property." Thus ended the more than forty year period of depredation by neglect and plant hunters.

Restoration moved slowly. In 1923, concerned citizens persuaded the association to open its membership. Paid memberships and specially raised funds speeded repair of buildings and replacement of walkways. A serious study of the garden's original plantings revealed only eighty-two of those listed by Thomas Meenan, gardener, in 1853. The present guideline for replanting is based on the list culled from Bartram's records of what he grew there. The original garden area, which includes the house, is reserved for plants known to have been grown by either John or William Bartram.

The visitor may speculate whether or not John Bartram actually planted the ancient yellow-wood, Cladrastis lutea, a tree whose sap provided dye for early settlers. They may also conjecture if William saw to the planting of the tree box, Buxus sempervirens arborescens var., and the giant Ginkgo biloba. It is known that about 1784 three young ginkgos were sent from England to William Hamilton. He planted two in his garden, the "Wood-
lands", now a cemetery, and gave the third to William Bartram.

The great black mulberry, *Morus nigra* memorializes the fruitless dream of those who attempted to establish a silk industry in this country. West of the house are several specimens of the Franklin tree, *Franklinia alatamaha*, descendents, no doubt, of seeds gathered by William. There are plenty of other tree and shrub offspring of original plantings to entice the visitor to explore this significant garden.

**Restore, Preserve and Promote**

Since the John Bartram Association affiliated with the Garden Club of Pennsylvania in 1950, the current hostess garden club is responsible for suitable colonial arrangements for the house, also its Christmas decorations. It provides hostesses and guides for special events and occasionally raises funds for special plantings.

The John Bartram Association continues to restore, preserve and promote the heritage of Bartram's Garden. They furnished the house, provide many plantings, pay for part of the help, supply literature for sale and underwrite much of the research.

Around the clock guards are provided by the Fairmount Park Commission which has charge of maintenance and capital improvements. Correct and current labels are a challenge in any garden. Fairmount Park Commission has begun replacement of the outdated remnants from three former sets of names using currently correct labels which are highly legible and hopefully vandal-proof. It maintains eleven acres as garden with the rest having picnic benches, a baseball field and playground areas. The grounds are always open and free except for a small fee required to see the house itself.

Engulfed by the city, nudged by a housing project, fighting the pollution of its swamp areas by neighboring industries, Bartram's Garden remains a magic carpet to carry the visitor back through the pages of history to glimpse again the garden of America's first botanist.

**BIBLIOGRAPHY**


Evans, Margaret W. *Personal communication*, Feb. 11, March 3, 1972.


A watercolor-drawing, inspired by display of hibiscus at Denver Botanic Gardens, done by Mrs. Barbara Nielsen. The picture was exhibited in June at the Colorado Watercolor Society sale and exhibition in Horticulture Hall.
KERRIAS

A. C. Hildreth

Kerrias are seldom planted in the Denver area. Yet these attractive shrubs are well adapted to the climate and soils of the plains. The bush is upright in form and about eight feet tall. The many slender stems, or canes, arise from the ground after the fashion of a bamboo clump. The twigs and young stems are bright green the year around, making this one of the few hardy shrubs worth growing for its bark color.

The dark green leaves are heavily veined and have coarsely-toothed margins. The fully double flowers are about an inch and a half in diameter and golden orange in color. Blooming starts the latter part of May and continues two or three weeks, after which occasional flowers open until the end of the growing season.

Kerrias are suitable for border planting and are especially good as specimens. They should be planted where they will have at least partial shade. The north side of a building is an ideal site. These shrubs require no special treatment as regards watering, fertilizing or mulching and they are generally free from insect pests and diseases.

The indeterminate growth habit of these shrubs makes the branch tips liable to some killing back in winter. The damaged tips turn brown. In order to improve the decorative effect of the shrubs, the brown tips should be snipped off as soon as they are detected.

On old stems, the bark color changes from green to brown. The brown discoloration detracts from the appearance, especially after leaf fall. The brown-barked stems, together with any very weak or damaged green stems, should be cut back to the ground immediately after the blooms have faded. This practice also serves as a rejuvenation treatment, keeping the bushes continuously in a vigorous condition.

Kerria bushes tend to develop suckers. These can be dug up and transplanted to some other part of the garden or given to friends. If not needed for such purposes, the suckers should be dug up and discarded as they appear, otherwise they eventually will develop into a thicket.

Nurserymen propagate Kerrias by cuttings of mature wood taken preferably in early fall and rooted in the greenhouse. They may be increased also by dividing old clumps or simply by digging up young suckers and transplanting them to nursery rows where they are grown to marketable size.

Kerrias belong to the Rose Family, Rosaceae. Botanists recognize only one species, Kerria japonica, native in China. This species has been known by the common names Kerrybush and Jews-mallow, but Kerria is now generally used as the common name as well as the generic name.

From such names as Kerria and Kerrybush, it might be concluded that this shrub is associated in some way with County Kerry, Ireland. Such, however, is not the case. The name Kerria honors William Kerr, a gardener, of Kew, England who introduced to England from China, this and many other different kinds of plants.

There are both single- and double-flowered forms of Kerria japonica. The one discussed thus far as the double-flowered form, is the botanical variety Kerria japonica pleniflora, known by the common names Globe-flower and Japanese Rose. This was the plant which William Kerr introduced to England in 1804. It is also the one usually seen in Denver gardens, and the one commonly offered in nursery trade. The single-flowered form was introduced much later, in 1834.

The double-flowered form is reputed to be harder than the single-flowered one, but both seem to thrive in the Denver area. It is also claimed that the double flowers last longer than the single ones.

There are some interesting variegated botanical varieties of Kerria:

Kerria japonica picta, a dwarf shrub, less than three feet tall. It has white-edged leaves and single orange flowers.

Kerria japonica aureo-vitissata has green and yellow striped stems.

Kerria japonica aureo-variegata has leaves edged with yellow.

Apparently, none of these three variegated forms has yet reached Denver.
Newcomers to the Denver area are often disappointed because there are so few broad-leaved evergreens available for landscaping. It is true that broad-leaved evergreens are adapted to more humid climates and most of them do not tolerate our sunny, dry winters. Fortunately, however, time has proven that Oregon hollygrape or Mahonia, one of the most beautiful of all broad-leaved evergreens, can be grown in Denver under proper conditions.

Because they are plants of moist, humid regions, leaves of broad-leaved evergreens burn when they are exposed to sun and dry air during the winter. If grown in full sun they will lose their leaves in the autumn. In the Denver area, Oregon hollygrape should be plant ed in the partial shade of an east or north exposure. With plenty of water and good cultural care, it should remain attractive all year long. Any winter-burned leaves can be cut off in the spring.

Oregon hollygrape or Mahonia is a medium-sized shrub, averaging about 4 feet in height. It is grown primarily for its foliage which resembles that of Christmas holly. Each leaf is made up of 5 to 9 spiny-toothed leaflets. They are leathery, shiny above and pale green beneath. They often take on a metallic appearance, and in autumn they may turn red or bronze. New summer growth is a light shade of green.

The small yellow flowers are produced in dense clusters followed by dark blue berries in bunches somewhat reminiscent of grapes. The berries are edible and can be used to make jelly.

The name Oregon hollygrape is very appropriate, reflecting the shape of the leaves and the appearance of the clustered berries. The shrub grows naturally from British Columbia to California and is the state flower of Oregon—hence Oregon hollygrape.

Oregon hollygrape is a member of the barberry family, Berberidaceae. Other well-known members of the family include Japanese barberry (Berberis japonica Spreng.) a popular ornamental shrub; and common or European barberry (Berberis vulgaris L.), an introduced shrub often escaped from cultivation. Because

European barberry is an alternate host for harmful wheat rust, it has been nearly eradicated in wheat-growing areas. Not all members of the family are shrubs—May apple or mandrake (Podophyllum peltatum L.) is a well-known wild flower of the eastern woodlands.

You may find Oregon hollygrape listed as either Berberis aquifolium Pursh or Mahonia aquifolium Nutt. Oregon hollygrape was originally (1814) classified as Berberis. Later, in 1818, it was re-classified as Mahonia, primarily because of its pinnately compound leaves and unarmed branches. In the genus Berberis, only the terminal leaflet develops into a foliage leaf and the other leaflets are modified into thorns at the base of what appears to be a simple leaf. Some present-day taxonomists feel that the differences are not sufficient to justify separating Mahonia as a genus, and they return these pinnate-leaved shrubs to the genus Berberis. Most reference books on shrubs, however, still list Oregon hollygrape as Mahonia.

Berberis is derived from an Arabic name for the fruit—Berberis. Aquifolium is from the Latin, meaning point and leaf and referring to the spiny leaves. Mahonia is named for Bernard McMahon or MacMahon, an Irish-American horticulturist who lived from 1775 to 1816.

For political reasons, MacMahon left Ireland and came to America. In 1796, he settled in Philadelphia and established a nursery and seed house. His place of
business became a horticultural center where many prominent horticulturists gathered for discussion. MacMahon was active in exchanging seeds and plants from other parts of the United States and from other countries. Many of the seeds brought back from the Lewis and Clarke expedition were entrusted to MacMahon by President Jefferson.

Oregon hollygrape was introduced into England by David Douglas who explored the Pacific northwest between 1825 and 1827 and took the shrub back to England when he returned. By 1838 it was widely used in England and was considered by many gardeners to be the most attractive broad-leaved evergreen grown in England.

A close relative of Oregon hollygrape grows in the mountains of Colorado. This is Berberis repens Lindl., (or Mahonia repens Don), commonly called Oregon grape. It is a low-growing, creeping ground cover found on hills and slopes, often in partial shade. It is valuable in preventing erosion and providing food for birds and mammals.

The species name repens means creeping. The plant resembles Mahonia aquifolium closely except for its prostrate habit of growth. Berberis repens is sometimes grown in Denver as a ground cover, attaining a height of about a foot. Native plants do not transplant well and they should not be removed from their natural habitat where they are an important part of the ecological system. Buy nursery-grown stock which is easily transplanted and established and can be counted on to succeed.
Ever have a yen for your very own butterfly ballet? Or have a dry sunny spot in your garden boasting poor but well-drained soil? Then you have the perfect combination for growing Buddleia alternifolia, Maxim., also known as the fountain butterfly bush. From late May to mid-June, its slender twelve to thirty-six inch branches are transformed into sweeping arcs of lavender set into motion by the slightest breeze. Thousands of tiny, tightly clustered blossoms emerge along the stems in their special spiraling pattern. Their fragrance proves irresistible to all types of butterflies, especially the drifting swallowtails. It is not unusual to count in one glance a dozen huge black and/or yellow beauties vying shamelessly with lesser butterflies, moths and a motley crew of other insects for a foothold on the freshest flower.

Buddleias belong to the family Loganiaceae. Carolus Linnaeus named the genus Buddleia in honor of Reverend Adam Buddle, vicar of Farnbridge, England. It was a courtesy well-deserved, for this clergyman’s work as a botanist over-shadowed his work for the church, and his collection of plants is preserved in the British Museum. The name “alternifolia” recognizes this species’ alternate leaf pattern which sets it apart from most of its relatives.

Of the nearly 150 known species of Buddleia, only two are indigenous to this country, none to Colorado. Most are found in warmer climes of Asia, South America and south Africa. Some make fine greenhouse subjects. Few are suitable as shrubs for our gardens since they tend to freeze to the ground.

B. alternifolia was found in Kansu (Northwest), China, and was later introduced into cultivation by Reginald Farrer. It is the earliest of the Buddleias to bloom. Unlike its more tender relatives, this woody shrub does not freeze back in our normal winters. Its arching form contrasts gracefully with the usually rigid silhouettes of other border shrubs. In early May, the one-to-four inch willow-like leaves appear showing only their silvery undersides. As the blades lengthen during the flowering period, the rich green of the upper surface finally dominates.

**A Handsome Addition**

The spectacular bloom gives way suddenly to a period of new growth. Shoots emerge at awkward right angles along the spent, pendulous branches. Now is the time to prune severely. Thin out poorly placed, unwanted canes. Cut back branches by one-third or to a well-placed young shoot. Done annually this prevents a scraggly look, keeps the shrub within desired boundaries and encourages next year’s bloom to set on the newly formed wood. Here in Colorado, fountain butterfly bush may spread ten feet across and arch skyward almost the same, as in the specimen pictured. For the smaller garden, judicious pruning will keep it restricted to a smaller space without sacrificing heavy bloom. If an early spring examination reveals freeze damage, prune well below the injured portion back to live wood. Vigorous new growth will soon cover the scars.

The fountain butterfly bush is a handsome addition to the shrub border. It is an effective screening plant for privacy. It is popular with several species of birds as its seeds ripen. Try it as a specimen billowing over a wooden fence or down a rocky wall. Plant it where you can sit awhile and “pleasure” in its beauty. Plant it for its heliotrope-like fragrance drifting across the garden, delight in the butterflies it lures. Plant it so that all who pass may share in your good fortune.
IN PRAISE OF THE GLADIOLUS

Some instructions on its culture

Some recommended varieties

Lee Ashley

The most beautiful of our summer flowering bulbs is the gladiolus. It's spikes are tall, some five feet or more in height, and often there are several spikes from the same bulb. The flowers are of almost every desirable color -- bright red, creamy white, pure yellow, green, many tints of pink, and those with lovely blotched throats. Perhaps we have no flower which presents such a gorgeous display of delicate yet brilliant colors in the garden, on the exhibition tables, and when used as floral decorations. It is not strange that the gladiolus is exceedingly popular.

For many years the hybridizers have been working with the gladiolus to improve its color and growing habits. Here in Denver we have several people doing hybridizing and we have managed to add a few ruffles to the petals, creating varieties called "pleated" gladioli by the public. These flowers have substance so heavy that it is a wonder they can ever open. They have created much interest at the flower shows and the corms have been sold for as much as ten dollars each.

The culture is very simple. Set the corms from six to nine inches apart and cover about four to six inches. If set in rows, they may be closer. Planting may be done at different times from the end of April to the first of June to secure a long succession of bloom. Keep the earth mellow, and add a little superphosphate to make them grow strong.

Give them plenty of water, especially at the time the fourth leaf shows. This is when they start to produce the flower spikes. It is also necessary to spray them for thrips. We spray with one of the insecticides made for this purpose. By spraying every ten days and using several different brands, you can prevent all traces of thrips.

In the late fall, take up the bulbs, let them dry for a week or more, and remove the old corm and roots. We cut off the tops close to the corm when they are dug. Dust with a soil-and-bulb dust and store in paper sacks in your basement. They will be ready to perform again next year.

Here is a list of some of the best bets of a Grand Champ:

- Vicki Lin, pink
- Parade, salmon
- Lady Bountiful, cream
- Angel Eyes, white, lavender blotch
- Pink Prospector, pink
- Shirley Cole, red
- Moon Mirage, yellow
- Parsifal, white
- Dairy Queen, cream
- Isle of Capri, orange

Here are some that were created here at Denver Botanic Gardens. For real beauty these are hard to beat:

- Pleated Lace, orange
- Charming Maid, salmon
- Doubloon, yellow
- Tokay, light purple
- Osa Mae, salmon orange
- Rare Jewel, rich lavender
- Apache Girl, yellow-orange
- Rose Point, rose-pink
- Spun Gold, deep yellow
The Helen Fowler Library now houses the Kathryn Kalmbach botanical stamp collection. The four albums of postage stamps, lovingly collected and meticulously classified and arranged by Mrs. Kalmbach, were presented to Denver Botanic Gardens by Dr. Edwin R. Kalmbach.

The name of Kathryn Kalmbach (1886-1962) has been associated with DBG for many years. She was a frequent contributor to The Green Thumb, writing on botanical and horticultural subjects. Her special interest was in the herbarium which now bears her name, and she worked tirelessly with local botanists to collect and prepare specimens for it.

A collection of botanical stamps is an entirely fitting endeavor for such a person. Characteristically, she made her collection a scientific one, and it came to be outstanding in its field. Mrs. Kalmbach was a member of the American Topical Association, an organization of philatelists collecting by subjects rather than by country. Her articles in the journal of this society brought her recognition as an authority in the field of plants on stamps.

The best method of describing the stamp collection is perhaps to use the words of Mrs. Kalmbach in her introduction to the first album, dated November, 1956:

An article in the American Gardeners' Chronicle in 1945 by Mr. Charles H. Curtis of England, described his collection of plants on stamps, which was arranged by plant families, rather than by countries. At the suggestion of Professor Joseph A. Ewan, then botanist at the University of Colorado, I began a search for stamps picturing plant life, in hopes of making a similar collection. Growing slowly at first, the last few years more rapidly, my collection at this writing shows over 5,000 stamps arranged under 99 flowering plant families, and four non-flowering groups. (In 1960: 7,000 stamps and 127 families.) My collection includes not only those stamps with plants as the main feature, but also those having plants as parts of border designs, or other minor decorations. Used, as well as mint stamps, are included.

Stamps in each of the plant groups are arranged alphabetically by countries; except that any United States representative are always at the beginning of each group.

The collection also includes, in a separate division, stamps picturing agricultural subjects. These subjects include all forms of farm work, such as plowing, sowing, harvesting, etc., as well as farm machinery, farm buildings, farmers and farm children. Other occupations using plant products are also included, such as basket making, textile work, logging, etc. There are also shown botanists, botanical gardens, agricultural scientists and institutions, parks, etc. This part of the collection will be found in Volume IV, following the plant families.

The Denver Botanic Gardens appreciates the gift of this collection to the Helen Fowler Library. No stamps have been added since the death of Mrs. Kalmbach in 1962. Obviously, this collection should be continued and so we are asking our members and friends to add to it. Should you see any stamps depicting botanical and/or horticultural subjects as well as those featuring the subjects enumerated for volume four, please save them for the library. To prevent damage to a cancelled stamp a margin of ½ inch of paper should be left around it.

The stamps will be shown to interested individuals by appointment. Please call 297-2547, Ext. 24.

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**LET'S PLAN FOR A BEAUTIFUL COLORADO IN 1976!**

Plans are now being formulated for a great Centennial-Bicentennial of the statehood of Colorado and of the beginning of our United States. Thousands of people will be flocking into our state in 1976 and we will need to put our best foot forward, sweep our floors and wash our windows, to properly present our state to our many guests.

What better time than now to survey every community, small and large, and make definite plans for needed improvements - trees, parks, playgrounds, business fronts - and for displaying our mountains, canyons and forests at their best. In doing this we can develop to the fullest the use of new plants, especially our own good natives, teach everyone a better use of water, soil and fertilizer, and really develop a much needed "Landscape Architecture for Colorado."

Here is where we need dedicated leadership. We have in Colorado many competent people who are experts in all phases of horticulture, and who could now contribute of their expertise in really dressing up the state for this occasion. The horticulture departments of our colleges, the Botanic Gardens, the Nurserymen's Association, Association of Landscape Architects, garden clubs and others should immediately get together and plan to cooperate with this celebration committee to get this necessary work planned now and executed in time for the 1976 events. We need leadership. Where will we get it? Who will volunteer?
Today’s Situation, Tomorrow’s Probabilities: According to a Long-Range Study by the Denver Water Department.

After water is supplied to all the new homes and industries in the booming Denver area, will there be enough water left over to irrigate our lawns and trees and gardens?

As the area’s growth spirals upward, eating up the open space around us, bringing more people, more houses, more commerce and industry, horticulturists and home-owners are increasingly concerned about the future supply of water needed to maintain this oasis.

What can we expect?

There are some answers in the large three-volume study, published in June, 1969, by the Denver Regional Council of Governments. Called “Metropolitan Water Requirements and Resources,” the study was made by the Denver Water Department. It covered the urbanized portions of Adams, Arapahoe, Boulder, Denver and Jefferson Counties.

Yes, says the study, there will be enough water for landscape irrigation; if population growth continues as indicated in 1969, if our uses of water are about the same as they have been, and if all the planned water developments are financed and built.

The 1968 study discusses the irrigation situation to some extent, beginning with records of the U. S. Weather Bureau in Denver:

“Winter months are normally driest with December and January each recording about ¼ inch of moisture. The high frequency of either dry Continental or exhausted Pacific air masses account for these dry winters. The spring months of April and May are typically the wettest, as moist air from the Gulf of Mexico begins seasonal penetration northward up the high plains. The mild months of June through October average an inch of rainfall or better. However, this rainfall is usually very spotty with showery characteristics. On the whole, the urban climate is most accurately described as semi-arid. Native vegetation when man first settled the region was primarily grasses and shrubs with only a few deciduous trees along the stream beds. It is said that whenever you see a tree in Denver today it is there because somebody cared enough to water it. The natural rainfall does not favor extensive vegetation.”

In two out of ten years, the study says, Denver has 11.4 inches of precipitation or less, and the winter months will average ¼ inch or under. At the other extreme, two out of ten years will have 18.4 inches or more. 1965, with its floods, was one of those wet years. (Compare Denver’s average of 14.81 inches with Cincinnati’s 39.51 inches, Chicago’s 33.18, Des Moines’ 30.37, Omaha’s 27.56, and New York’s 42.37 inches.) Paradoxically, Denver’s most critical water problems are recurring drought and floods.
40% FOR LAWNS

It is pointed out in the Water Board study that our semi-arid climate requires large amounts of artificial moisture to support growth of lawns, trees and flowers. The study says that it takes about one inch of water per week for our lawns during the May through September growing season when normal precipitation is only eight inches. Therefore, about 18 inches of additional water is required. Little, if any, of this water returns to the ground water aquifer since the general movement of moisture in the top 4 to 6 feet of soil is upward toward the atmosphere. Nearly 40 percent of the municipal and industrial water supply is used for lawn sprinkling.

The quantity of irrigation water used in Denver, the study says, is dependent on these things: the amount of precipitation, the cost of the water, whether it is metered or not, the economic level of a neighborhood, the restrictions placed on water use, and, especially, the public concern regarding the adequacy of the water supply.

In looking to the future, the study lists several factors that could reduce irrigation demand. Lawns may be artificial, not requiring water, or lawn area may shrink or even disappear in large urban areas as multi-family dwellings attract a larger segment of the population. Other technical changes may provide de-humidification of the air or recycling of domestic wastes to irrigate lawns on an individual housing unit basis.

Nonetheless, the study reasons that "because technology of water supply has changed very little in this century, all projections ... are based on current conditions." That is, the experts expect us to use water in about the same quantities as in the past.

458 MILLION GALLONS IN A DAY

Most of the study is made up of projections of population, water supply, and water demand in the future. In 1969, when the study was completed, the Denver Metro area was estimated to have a population of 1,200,000. Denver itself had a water supply of 319,000 acre feet, and other agencies had 110,000 acre feet; a total for the area of 429,000 acre feet. 1969 demand for industrial and municipal use of water was estimated at 262,000 acre feet, well below the supply.

(Literature sent out by the Water Is Necessary Committee, prior to the recent bond election, reported this near-shortage: "The complex Denver water system ... is capable of treating and delivering approximately 460 million gallons of water a day. On July 12, 1971, the temperature hit 101 in Denver. The city's water use soared to 458 million gallons. Not that the city would have run out of water if the use rate had exceeded 460 million gallons. The Water Board has an additional 246.9 million gallons in small treated water reservoirs at strategic locations throughout the service area. But the system could not have absorbed a series of such days without severely restricting water use. And, in the future, there will be many hot days and ever-increasing numbers of Denverites using water.")
From this, it appears there will be no shortage of water for the area until after 2010 — if all proposed developments are financed and built. Says the report: “Included in the projection of supplies are additional waters from the present Moffat, Blue River and Homestake sources” and “new supplies from Englewood’s Ranch Creek, Denver’s Eagle-Piney, Straight Creek, Gore and Colorado River sources.” Our future water supplies, then, are to come from the Western Slope of the Rockies. The additional sources mentioned were in the preliminary planning stage at the time of the study.

An interesting statement in the report is to the effect that converting our land to municipal and industrial uses will provide a growing supply of water. Presumably this means that considerable water now used for agriculture will become available for other uses.

DENVER TO SUPPLY THE AREA

The major premise of the study is a fairly new one: the Denver Water Department no longer looks on itself as just a supplier of water to the city itself; it is now and will continue to be the primary source of water for the whole metropolitan area. In fact, its importance to the community outside the city will greatly increase in the future as some of the smaller systems, including Golden, Baker Water District, Broomfield, Louisville and Lafayette, and others, run out of water. This new status as the regional supplier of water was at the bottom of the opposition to the water bonds voted on in July. Opponents hoped to limit regional growth by limiting water supply — a policy the State of Colorado has been wrestling with in recent legislatures.

On July 11, the voters of Denver defeated a Denver Water Board proposal to issue bonds for $200 million to pay for the enlargement and improvement of the city's water system. By their vote, the majority appeared to be saying that they did not feel that the Denver system should furnish water for unlimited growth outside the city.

In addition to the $200 million bond issue which was turned down, the Water Board had expected to obtain another $155 million from “development” charges to finance a 12-year plan.

The plan included a new $60 million Foothills Complex on the South Platte for treatment of the water, $76 million for additional and replacement transmission pipe lines, some $20 million for a recycling project, $31 million for extension of the Fraser River and Williams Fork collection systems, $103 million for a project to bring water from the Eagle and Piney River into the Dillon Reservoir, and sufficient funds for improvement and expansion of present facilities.

Undoubtedly, this rejection of the bond proposal has put a brake on the contemplated developments. It could mean that there will not be as much water for landscape irrigation as expected. It may mean that water will cost us more than in the past.
Hayward, not a member of the committee but close to it, has certainly created works of art that are much appreciated. We are fortunate to have such artists as these.

This spring, when I started work on the summer issue, Margaret Sikes turned over to me most of the material needed for that issue. She, and the rest of the committee, were completely prepared.

It's plain to see that these dedicated people, so involved and so concerned with our magazine, have made it and maintained it and continue to strengthen it, regardless of printers and editors who may come and go. They, and all the others before them, have established a magazine with a vibrant life of its own; a growing thing, firmly rooted in experience, sending up strong healthy foliage in the sun, flowering profusely, and delighting all who love plants and gardens and beauty.

As Denver Botanic Gardens expands, becoming the prestigious center of horticulture in the West, The Green Thumb must move with it as the resonant voice of The Gardens. I am enthused over the opportunity to have part in publishing The Green Thumb.

My credentials: I am now one of Colorado's three state land commissioners, a position I will leave in January, 1973. A long-time civil engineer, I am a past president and honorary life member of the Colorado Society of Engineers. My greatest interests have been in gardening and journalism. I have been publisher of one weekly newspaper, editor of another, editor of an engineering magazine, and I have, for years, written regular monthly columns for two engineering magazines. This year I am president of Men's Garden Club of Denver.

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A Non-Profit Organization

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Denver Botanic Gardens maintains a collection of living plants, both native and exotic, for the purpose of acquiring, advancing and spreading botanical and horticultural knowledge.