A botanic garden is a collection of growing plants, the primary purpose of which is the advancement and diffusion of botanical knowledge. This purpose may be accomplished in a number of different ways with the particular placing of emphasis on different departments of biological science.

The scientific and educational work of a botanical garden centers around the one important and essential problem of maintaining a collection of living plants, both native and exotic, with the end purpose of acquisition and dissemination of botanical knowledge.
THE COVER

*Cypripedium calceolus*

Photo by Carol L. Radetsky

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**The Green Thumb**

VOL. TWENTY-NINE, NUMBER TWO  SPRING 1972

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By becoming a member of Denver Botanic Gardens, you will receive THE GREEN THUMB and the monthly NEWSLETTER. You will also have unlimited access to the use of the books in the Helen K. Fowler Library, now located in Boettcher Memorial Center at 1005 York Street.

For further information write to Membership Chairman, Botanic Gardens House, 909 York Street, Denver, Colorado 80206, or call 297-2547.

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Shrubs and trees have definite personalities that have specific appeal to particular species of birds. The Van Bibber Creek Water Gap in which we have lived for 20 years has a natural wealth of native shrubbery and some trees, many of which attract birds as well as being suitable for landscape plantings. We have used most of these native shrubs about our buildings and have come to value some of them for their special ornithological appeal.

First among the native shrubs, we prize the hawthorn, *Crataegus succulenta*, or its close relatives. This genus is irresistible to a wide variety of birds for protection, for food, and for nesting. The hawthorn becomes a small tree with numerous thickly twigged branches that bear attractive clusters of whitish flowers, followed by numerous clusters of tiny red apples in the fall. The leaves color with the frosts and are borne on attractive, dark, smooth twigs that have charm during the winter. For most warblers, hawthorn has no peer at our place. During spring migration, we look to hawthorn for the unusual warbler migrants, for the early kinglets and gnatchasers. The fruit-eating birds throng amid its branches in the fall and during the winter it shelters the juncos and sparrows; our occasional mockingbirds prefer the hawthorn for nesting. *Crataegus* is a must for the bird garden. It is tolerant to a variety of soils and locations and should grow most places below the lodgepole elevations.

For those who have ample space for larger shrubs and trees, I must mention the box elder, *Acer negundo*. As a landscape tree, it is generally unloved by the property owner, but to the birds, it provides a local paradise. A mature box elder with its dense foliage, insect populations, hollow trunks, and its protruding dead limbs, will serve more species and numbers of birds than almost any other tree. We have two ancient box elders plus some younger ones in the Gap. Flickers, Sparrow Hawks, Lewis’ Woodpeckers, House Wrens and probably other birds have nested in the hollow trunks. The major and minor branches always support nests. Warblers, vireos, and kinglets of every recorded species feed high and low in these box elders. The box elder should grow throughout the cottonwood belt and up the canyons.

For the small yard, there are three very desirable shrubs with attractive flowers, fruits, and fragrance, all adored by birds. These are the thimbleberry, *Rubus deliciosus* (named by Dr. James who was the first white man to ascend Pikes Peak in 1820 when the Long Expedition passed that way), the golden currant, *Ribes aureum* and the chokecherry, *Prunus melanocarpa*.

Planted close to our buildings, the thimbleberry is a favorite nesting shrub for the Lazuli Bunting. It is a lovely white-flowered shrub with sweet, edible fruits and graceful spreading branches which look nice during the winter. It does not enjoy crowding. If watered, it makes a rapid initial growth up to about 4 feet high and a bit wider.

The golden currant lives up to its name with masses of fragrant yellow flowers, followed by yellowish currants of excellent flavor. It can be planted in mass or singly in the open where it assumes a graceful drooping stance about 4 feet high and 6 feet wide. The small birds seek its shelter all through the year, and towhees steal its fruits.

Unlike the first two, the chokecherry is very upright and will stretch to 8 or 10 feet tall if favored with soil or water, or even make a small tree of 4 inches or more diameter at the end of many years. It stands pruning, and if cut back, quickly produces new shoots. It provides an excellent screen or hedge without trimming, in sun or shade. Although most of our birds make use of the chokecherry, it is the favorite of Evening and Black-headed Grosbeaks. They come for the berries long before they are ripe. Berries that survive to dark ripeness make fine jelly if they escape the thrush family, or the towhees. The chokecherry bloom clusters are very fragrant and attract butterflies.

Around stone walls and foundations, we plant the common native gooseberries, *Ribes inermis*. It has many virtues. It is the first shrub to leaf in the spring and one of the last to color and drop in the fall. In between, its deep shade shelters the House Wren and other small birds. The towhees love the sweet dark berries. Half bush and half vine, it can be trained both ways with delightful effects. Few weeds can compete with its early growth and deep shade. On poor soils it will relish some fertilizer and help cover barren spots. We constantly find new uses for this gooseberry.

There are three more shrubs that are hard to resist if one has the space, and they do not need very much. These three are the service berry, *Amelanchier alnifolia*; the ninebark, *Physocarpus monogynus*; and the waxflower, *Jamesia americana*.

In the wild, the serviceberry is often a ragged bush, perhaps because it is a favorite browse shrub for large and small mammals. But when given a chance, it grows upright into a small tree of graceful proportions.
Its cloud of white bloom comes early and is followed in the summer by dense spread of branches and twigs about twice as wide as high and very attractive, in a rounded growth which in time reach 4 to 6 feet in height. It is very hardy, and will grow on hot, dry banks if given a start. Next to the hawthorn, it seems to have an especial attraction for birds. In banding, my nets set near trilobata have caught specimens of most of the smaller lower-level birds except the flycatchers, for which it is probably too dense. If trilobata is used, it is best to give it ample room, and while it is small, plant early flowering bulbs and perennials around its perimeter. But if you have the room, it will be a favorite with its steady stream of bird visitors. Perhaps the Rufous-sided Towhee will nest under it on the ground, if you live in its narrow, foothill nesting belt.

Lastly, there are two willows that should be mentioned. First there is the mountain willow, Salix monticola, common in the canyons. It likes water and if it gets water, it produces a splendid specimen plant when given ample room. It may grow as much as 10 to 15 feet in diameter both vertically and horizontally. When not crowded, it fills out at ground level to the full diameter. Almost all of the lower-level birds including the small flycatchers love this species and some of its similar relatives. I consider it the most attractive of the shrubby willows, and if you have space and moisture for it, you will enjoy many an exciting moment with its bird guests.

The other willow, the peach-leaf willow, Salix amygdaloides, develops into a medium-sized tree, usually with a number of trunks of rather equal size, but some times only one trunk develops. This is a stream-valley tree of the cottonwood belt. Like the box elder, it may become ragged in its mature years, but new growth springs up around the old. This is a tree of no special beauty, but apparently the birds, including the upper-level warblers, find it irresistible, as it has presented us with a number of rare finds such as the Black-and-white, Black-poll, Black-throated Blue, Parula, and Yellow-throated Warblers. Its foliage is thin, providing easy visibility.

There are many other species of shrubs and small trees, including the cultivated fruits, that are attractive to some species of birds, but my intention has been to list the native plants that have virtues for either birds or landscaping and usually both. These native plants are less demanding in their culture and most of them, once started, will manage by themselves with occasional pruning and watering. They won't die if neglected, and the birds will continue to appreciate their food and shelter.

Sometimes these species of plants are common and easily obtained locally. Occasionally, there is a nursery that can furnish most of them, as is the case with the Western Nursery, 14201 West 44th Ave., Golden, Colorado, 80401. This nursery has many other native plants. Most of the shrubs and trees that I have mentioned have considerable range in altitude. They are listed in Pesman's book, Meet the Natives, according to their natural habitat and will be found in more than one elevation range. All of them do best when not crowded; then they can fill out and be most productive for attracting birds. For the many families that have some acreage, these native plants offer many rewards in birds and landscaping.
The role of an engineer is often that of transferring a concept into reality in an economical and lucid manner. He can accomplish this with a set of specifications and drawings to guide a contractor in the creation of the reality, inspecting the contractor’s work to ensure that the original concept is preserved and that the intended high quality of the work is maintained. In short, the engineer takes an idea or concept and makes it work.

At Denver Botanic Gardens, the work of Wright-McLaughlin Engineers went beyond this. It included detailed explanations and word pictures to further convey the architect’s intent and final objective to the craftsmen assigned to this project.

The concept and site layout were developed by the Gardens’ landscape architectural firm, Eckbo, Dean, Austin, and Williams of San Francisco. Tim Downey, as an experienced and sensitive Project Architect, emphasized that maximum utilization of the 16 acre site could best be realized by creating a series of natural “rooms” featuring different forms, scale and botanic themes, connected by “corridors.” Thus a viewer could experience several unique atmospheres within the available space.

The pools, lakes, waterfalls, pylons and fountains each serve as features in a particular “room,” while the narrower chutes and channels, often paralleled by walkways, serve as “corridors.”

Wright-McLaughlin provided the engineering planning, design, and construction supervision for the hydraulic (water-related) features such as the pylons, waterfalls, fountains, and channels, as well as the more mundane and almost invisible systems – the irrigation lines, water recycling pump system, sub-surface drains and storm drainage facilities. In addition, other firms acting as subcontractors on specialty services were: Hornstein and White, architects; Jorgensen and Hendrickson, Inc., structural engineers; Rice-Marek-Harral & Associates, electrical engineers; and Chen & Associates, Inc., soils engineers.

For the engineers in Wright-McLaughlin, this was a chance to help create something stimulating, both aesthetically and technically. The waterfalls and chute in particular are both visually and audibly exciting as well as being unique outside an engineering laboratory. The water begins its journey atop the 15 foot pylons in the upper lake, continuing over a semi-circular waterfall especially designed to accentuate the sound of tumbling water, through a cobblestone sided channel to a second waterfall accentuated by standing waves. The flow is then accelerated along a narrow, shallow chute and lifted by a flipbucket (sort of a concrete ski-jump) to splash onto blocks at the upstream end of the lower lake. Near the stepping stones, water races over a 7 foot high waterfall, thundering into a rocky pool before meandering through the Japanese Gardens in a natural channel. After it arrives at the Gates Pool, the end of its visual journey, water flows to the pumphouse, almost hidden at the west end of the site, where it is lifted back up to the pylons at the rate of a 1000 gallons per minute.

While in operation, the decorative waterways contain 600,000 gallons of water, supplied via two buried meter vaults from City of Denver mains. A daily 3% replenishment with fresh water was planned to prevent excessive algae growth with minimum power and water waste. Year-round operation is provided-for with minimum maintenance.

The hidden portions of the project are equally as important as those we can see.

For instance, the 9000 feet of irrigation lines can distribute water throughout the gardens in patterns to accommodate various plant requirements, while a separate 2100 foot potable water system will satisfy thirsty visitors. Sub-surface drainage from beneath the waterways and critical planting areas is directed to the storm drainage system, having 3900 feet of underground piping with site grading integrating the landscape architect’s design. This system actually retains some storm water runoff during storms, allowing discharge rates to be kept lower than normal to prevent overloading downstream while providing for natural irrigation and improvement of the quality of the water eventually discharged.

Construction, begun in October 1970 by Langfur Construction Corporation, was completed in August, 1971 at a total cost of $280,000; the waterways are expected to be operated continually upon completion of the sidewalks currently being installed. Final landscaping will be accomplished in the future.

As engineers, this project has been for us a memorable opportunity to use our abilities in service to both man and nature. The entire project is an effort to improve the social and physical environment of urban dwellers. As our contribution to the expansion moved towards reality, we’ve enjoyed working with Eckbo, Dean, Austin & Williams and with the Denver Botanic Gardens Directors and staff; now we too, must wait until nature provides the final touch.

Editor’s Note: The Wright-McLaughlin Engineers design for the Denver Botanic Gardens has won the first place award in the Engineer’s Excellence Contest sponsored by the Consulting Engineer’s Council of Colorado.
Charlotte A. Barbour, born Charlotte A. Berger, daughter of Charles Bart Berger and the granddaughter of Senator and Mrs. Nathaniel P. Hill, spent her early years in Denver. Her father died before she was born. Summers were spent with her Grandmother Berger at Estabrook. Later in life after she had returned from the East, she built a small cabin on some of the Estabrook land, showing her love for the area that had afforded her so much pleasure in childhood.

Charlotte completed her undergraduate work in Paris and later received a degree in journalism from Columbia University. She was a literary agent in New York City.

She was married to Alexander L. Barbour in 1917 and they divided their time between New York City and a farm in Lisbon, New Hampshire. When the snow was deep, they would spend time in Concord. Being an energetic person, Charlotte took courses at the University in Forestry, did research and wrote articles for various magazines in New England.

After the death of Mr. Barbour in 1945, she returned to Denver and put her energies to use here. During the years that followed, she belonged to a number of organizations and was a member of the board of several. Two of these were Denver Botanic Gardens and Denver Dumb Friends League and to these in particular she devoted much time and energy.

Mrs. Barbour was City Forester for a time with Earl Sinnamon as assistant. Then reversing positions, she devoted her time to Publicity and Junior Education. Her car often contained an assortment of tree branches and other horticultural specimens.

In connection with their work in the Forestry office, Mrs. Barbour and Mr. Sinnamon did the text for a pamphlet published by the city with illustrations by M. Walter Pesman, called What Tree Is This? The booklet was not reprinted by the city and in 1965 Denver Botanic Gardens received permission for a new printing. It is sold only at Botanic Gardens Gift Shop. Any proceeds are turned over to the Helen A. Fowler Library.

By 1948 The Green Thumb listed Mrs. A. L. Barbour on the Publications and Publicity Committee for the then called "Colorado Forestry and Horticulture Association." One issue that year has an article Orchids to Mrs. Charlotte A. Barbour. It commends the work done on the magazine and mentions particularly soliciting for advertising. This interest continued through the years and she was on the editorial staff and contributed much to the magazine.

In 1949, Mrs. Barbour was elected to the Board of Directors and was listed as Secretary, as well as on some committees. She was a member of the Board continuously until her death and always active on several committees until ill health made it impossible.

After the death of Mrs. Helen Fowler in 1960 and the removal of the organization to the house at 909 York Street, the library needed help and Charlotte adopted it for her special interest. She made it possible to have a part time professional librarian in the person of Mrs. Hallriegel. Aided by a retired librarian, Miss Lucy Crissey, and willing volunteers, the library was restored to order. Among the special things done for the library were: supplying funds for materials to mount the Emma Armstrong Erwin watercolors in albums; having a case made for rare books; setting up a monthly payment for books; depositing money with the Trustees for moving the library to the new building.

Several years ago, Botanic Gardens Library was given quite a number of books from Mrs. Barbour's personal library. Since her death, Mrs. Prentiss Andrews, her daughter, has donated the remaining books that could be used in the Library.

Mrs. Barbour has been missed these last years when she could no longer be active. However, she showed great pleasure when callers could tell her about affairs of the Gardens, so her interest never waned.

M.L.S.

These are the things I prize,
And hold of dearest worth;
Light of the sapphire skies,
Shelter of the forest,
Peace of the silent hills,
Comforts of the grass,
Music of birds, murmur of little rills,
Shadows of clouds, that swiftly pass,
And after showers the smell of flowers
And of good brown earth,
And best of all along the way
Friendship and mirth.

—Henry Van Dyke

Carol L. Radetsky

The majesty and vastness of the Colorado Rockies always overwhelms me with their beauty and massive size; yet their gentleness and invitation to warmth and perennial growth is everlasting. Size seems incongruous to the mountains; this is a land of dramatic contrast producing large conifer trees and tiny alpine flowers. The vastness of the forest is sovereign as it watches over the miniature world below. The ladies slipper is part of this world, my world.

For Thoreau there was Walden. For me there is also Walden and my speck of the world above Evergreen. Seldom does a week go by when I don't make the opportunity to relish the miracles on this particular land. There are quaking aspen trees, numerous conifers, wild roses, daisies, fantastic lichen and juniper berries. Even the decaying tree stumps have their special beauty. The birds are plentiful and the chipmunks scamper around claiming their own territory. When you look up you can revel in soft white cumulus and cirrus clouds weaving their way through the sky.

Two years ago while enjoying a walk I almost literally stumbled over the remarkable ladies slipper. My immediate reaction was surprise and wonderment: "Wow, that's beautiful, what is it?!" It was gorgeous and I remember smiling and thinking — it looks like an orchid but orchids grow wild only in Hawaii! Initially it was identified through word of mouth by a friend. I waited an entire year to get a look at my discovery again. This year joyfully, I took a roll of film and smiled with each snap of my camera. How fortunate I am for God to share this exquisite beauty with me. As there were no other slippers in the area I went strolling on.

The beautiful bright yellow slipper is formed by one of three petals. The other two petals extend almost vertically to it taking on a brownish color and becoming twisted as they extend. The slipper itself is sac-like shaped with magenta colored streaks running throughout its base; it is about 2-3 inches long. A member of the Orchidaceae family, the herbaceous plant is about 10 inches high. The leaves look like spears taking on a ovate-lanceolate shape and are approximately 8 inches long. Sheathing tapers to a slender point at the base of the plant in an acuminate manner. The twisted petals unite at the apex of the stem.
About 30 species belonging to the genus *Cypripedium* have been discovered. The rare, *C. calceolus* L., yellow ladys slipper is almost extinct in Colorado. My special slipper was growing with a large quartz crystal as its shelter and it was nestled among the kinnikinick; its vibrant yellow color complimenting the sun. It stood proudly and with exquisite beauty. I discovered these ladys slippers above Evergreen in Clear Creek County. The altitude there is 8300 feet into the montane zone between the subalpine and foothill zones of the life zones. The slippers shared their habitat with kinnikinick (*Arctostaphylos uva-ursi*, L. Spreng) and the golden banner (*Thermopsis divaricarpa*, A. Nels.). Growing on the south side of the mountain the *C. calceolus* was found the last week of June and the first two weeks of July. In 1971, the climate was relatively dry. The recorded precipitation was only .02 inch during this time. Temperature ranged from 36-88°F. The soil pH is surmised to be acid because of the abundance of conifer trees and kinnikinick in the general area.

The world is filled with exciting and provocative stimuli to enjoy. We are increasingly aware of our environment and the minimal effort it takes to interrupt its delicate homeostatic balance. I feel it is our responsibility as curious and nature seeking people to cultivate an enjoyment of our environment and to protect its sensitive balance. We too, are part of this dynamic equilibrium. In so doing more people will be able to enjoy the ladys slipper as well as other plants and animals nearing extinction.

Hyacinth, *Hyacinthus orientalis*

Helen Marsh Zeiner

Hyacinths are such a familiar part of spring that we accept and enjoy them without giving a thought to how we came to have them. Our common hyacinths are hybrids and horticultural varieties of *Hyacinthus orientalis* L., found growing wild from Greece to Syria and Asia Minor. Present day hyacinths are quite different from their Eurasian ancestors. *Hyacinthus orientalis* is slender and graceful in contrast to its twentieth century descendants which are rather formal flowers with stout stalks and large blooms borne in heavy, straight spikes.

Some gardeners feel that hyacinths are too stiff and formal for many gardens – they have even been called “obese” and “overstuffed.” Hyacinths are a part of the garden scene for such a short time, however, that most gardeners do not mind the formal appearance. Whether or not we find the habit of growth pleasing, we can all enjoy the colorful and fragrant blossoms. In any case, hyacinths tend, if they become naturalized in a garden, to revert to a more slender and graceful habit of growth.

Hyacinths are one of the best bulbs for forcing for the indoor garden. Here the stiff habit of growth is no disadvantage. Hyacinths were cultivated by the ancient Greeks, whose selection, whether intentional or not, improved the strain. These early gardeners simply chose and preserved the hyacinths that appealed to them most, and thus they perpetuated desirable varieties. Hyacinths were introduced from Constantinople to Renaissance Europe in 1560. Their beauty and sweet scent made them immediate favorites and they became prime material for hyacinth fanciers to develop and improve. Much of the modern bulb selection and breeding has been done in Holland, and the bulbs are sold as Dutch hybrids.

The original wild hyacinth is believed to have been a light blue-lavender. By the sixteenth century, writers were describing hyacinths in blue, pink, and white and in both single and double forms. Today, there are many shades from pure white to cream or yellow; pale pink to deep rose-red; and light blue to purple.

Hyacinths are members of the lily family, *Liliaceae*. They are sometimes described as “bunch-flowered lilies.” Examination of the 6-segmented flower clearly shows the relationship to the lilies. There are about 30 species of hyacinths known, all native to the Mediterranean region, but only *Hyacinthus orientalis* is widely cultivated.

*Hyacinthus* is the ancient Greek name for this plant. As with many plants of such ancient origin, the hyacinth played a part in mythology. It is said that Hyacinthus was a handsome Greek boy. Zephyrus, god of the winds, and Apollo, the sun god, both loved Hyacinthus. The boy, however, preferred Apollo and plainly showed his preference, making Zephyrus extremely jealous. When Apollo challenged Hyacinthus to a game of quoits (in which a discus is pitched at a fixed target), Zephyrus hid in the nearby woods, watching and plotting revenge. When Apollo hurled his discus, Zephyrus deflected it so that it struck Hyacinthus in the forehead and instantly killed him. The grieving Apollo declared that the beauty of Hyacinthus should not be lost, but should be preserved in the beauty of a flower. He then summoned the hyacinth out of the earth in remembrance of his young friend. Thus the hyacinth came to signify remembrance, and it has been sculptured on tombs and headstones for this reason.

It is also said that Venus, to make herself more beautiful, bathed in the dew formed on hyacinths; and that the beds of Jove and Hera and Adam and Eve were made of hyacinths.
Small living creatures whose ancestors roamed the world millions of years ago can make their home happily in a glass garden. Tiny critters such as turtles, lizards, salamanders, worms, snails, frogs and chameleons thrive in this environment. They make a terrarium a living thing and offer an opportunity for a nature study both of plants and animals, especially for children. For shut-ins or apartment bound people, a vivarium is a pleasant thing to have around. It is fun to make and to observe and as a group project for children, there is nothing more exciting.

A fish aquarium is the best container for a vivarium although others can be used. The larger the better so the creatures will have room to wander. Lizards and animals of this type live better in a desert type landscape and others in a humid atmosphere. It is best to study each applicant for tenancy and find out what it likes best in the way of climate, food and water. It is thoughtful to have two of a kind in your garden so they won’t get lonesome. Brochures may be purchased in pet shops on various small pets or books may be found in your library.

Prepare your container as you would a terrarium, with sterilized soil and small gravel on the bottom. Place the gravel in a sieve and pour boiling water over it and allow to dry. Next comes a layer of charcoal over the gravel with a layer of clean fine sand and over this, your soil mixture composed of a third each of peat moss, loam and sand, 3 or 4 inches in depth. The landscape should be uneven with hills and valleys and the plants in varying heights, types and colors. (The same plants mentioned in an article entitled “Bottle Gardens” in the Winter Issue of The Green Thumb, 1971, are excellent for a humid vivarium.) For a desert garden use the same base with more sand added to the soil and the top covered with the sand. Use small cactus for the plants. Beautiful rocks placed around add much to the decor of any garden and give the pets a place to hide.

Turtles need supplemental feeding such as lettuce and watercress. Chameleons enjoy drops of honey, bits of bananas and grains of sugar placed on a leaf. They can go for days without feeding. Turtles, frogs and snails and such like a tiny dish of clean water embedded in the soil to drink and cavort in. The health of the animals is the responsibility of the landlord and it is necessary to study their habits and needs before attempting to make a vivarium. A cover of some sort should be added to the container, either wire mesh or a glass top, allowing some air to circulate.

The summer of 1970 will well be remembered by those who participated in the Children’s Gardens for a class on how to make vivariums. It was held in July and the children were told to bring the critters. There was an embarrassment of riches and the garage took on the appearance of a weird pet emporium, alive and jumping with tiny things that either crawled or swam. The animals were displayed for inspection and two gardens were made so the children could see how it was done. There were frogs, snakes, snails, turtles, worms, lizards and a Texas horned toad whose appearance had not changed much in a million years. The frogs were the jumping variety and “did their thing” by leaping in all different directions, trying no doubt to find their way back to Cherry Creek where the kids had found them. Little boys and girls were down on the floor of the garage on their hands and knees scooping them up and returning them to their containers.

The vivarium with two tiny turtles as occupants was the most popular and later was displayed in the summer house of the Children’s Gardens for the remainder of the season with the children caring for it. A contest was held to name the animals and the two turtles won by a large majority. They were named Bonnie and Clyde. Ten prizes were given in the contest and the names submitted were charming and imaginative as well as funny.
For the past 35 years I've been engaged in the growing of vegetables; the last 20 years have been here in Denver. My overall plan has always been the same: to select 2 or more varieties of a given vegetable and grow them together for comparison. Tomatoes have been my favorite.

I've entitled this article “trying” instead of “testing” because no actual measuring of plants, weighing of individual fruits, or of combined fruits per plants per year, was done. What I did do was study many catalogues, buy seeds from many sources, then grow from 1 to one-half dozen plants of each variety, and from 1 to 35 varieties per summer. Since I haven't the space or time to try every variety I see pictured and described in the seed catalogues, I choose carefully.

In picking tomatoes to try, I've stayed away from the commercial varieties with reputed good shipping qualities; this generally means a hard, tough tomato. When breeders of commercial varieties are developing new ones they use “drop tests” to determine whether a new variety or strain will ship well. Drop tests are carefully controlled experiments where tomatoes from certain plants, of the same degree of ripeness, are dropped from a definite point onto concrete. If they don't break, they are considered to be shipable.

However most home gardeners want tomatoes that taste good. The gardener should try a number of varieties (or ask many questions over the back fence), study seed catalogues, and sift through information to get that certain quality in flavor and texture, that balance of acid and sugar, that makes for a great tomato taste.

I have decided from my experience that garden varieties are improving for the production per plant is going up and the disease resistance is also up. However, certain ones seem to have changed over the years. Rutgers seems to be getting smoother and better looking but smaller. Earlina seems to be getting rougher and smaller. Ponderosa seems to be getting much smaller. Still memory can play tricks and many factors like soil and weather can enter in.

Often the initials V. or V.F. or V.F.N. are listed after the names in the American seed catalogues. This means that the variety has a measure of resistance, called triple resistance to one or all of the main enemies of tomatoes, verticillum, fusarium wilt and nematode. The nematodes are microscopic worms generally found in warmer climates. Look for these varieties for preventing disease is better than trying to stop it after plants start dying.

To start plants of a particular variety, say F-1 Terrific V.F.N. and F-1 Burpee V.F. look in the classified ads in the newspaper at planting time to find the growers then call them to see if they have started the

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variety you want. Never buy plants that don't carry a variety name. Because of the short growing season in Denver we need early varieties. Tomato breeders are continuing to develop plants which mature early and have good eating quality. The varieties listed below are quite new and I think they are great.

- F-1 Spring Giant
- F-1 Small Fry
- Fire Ball
- F-1 Spring Set V.F.
- F-1 Burpee Big Early
- F-1 Red Boy
- F-1 Sun Up

(However, the late varieties have the better taste and if anyone wants to gamble on the weather, he should try some of them.)

I'm certain in my own mind that you could save a few seeds from a tomato that you thought was a good one, start them in your own house in a south window 6 weeks before Memorial Day and end up with a better crop than if you just bought a box marked “tomatoes.” However I don't recommend it. Pick a good variety of seed from a catalog (not from seed packets in super markets or nurseries. Although their seed is fresh, you're limited to just a few old varieties). Start them 6 weeks before Memorial Day, then transplant them outside on Memorial Day. An easier way of course, is to buy from a grower. Good plants started in a green house in 2” or 3” peat pots will cost about $2.00 or $3.00 per dozen. Be sure the plants look strong and have a dark green color. The very expensive plants that are grown in a large container probably won't gain you a thing because the smaller plants will catch up.

Put the new plants out as soon as you get them home. Pick a place in the garden where they will get the most sunlight possible and plant them in good rich soil with good drainage. Spacing will depend on the variety and on whether you want to stake to a single stem, to 2 or 3 stems or let them spread on the ground. There are advantages to each of these methods of growing tomatoes. The largest tomatoes are grown when you stake to a single stem. However, you need to buy 2 or 3 times as many plants for a given area if you stake singly. Staking is more work. Total production by total weight is only slightly increased by staking but the fruit is cleaner, bigger and looks better.

Watering tomatoes can be a big problem in Denver. My first serious attempt at tomato trials was on sandy Cherry Creek bottom land. I got in the habit of watering heavily and had good luck with tomatoes. Next
I gardened a few years on rich heavy clay in West Denver. Here I had trouble adjusting to less frequent watering. Now I'm gardening on the rich sandy loam of Platte River bottom land. I had success in sand and sandy loam but I believe if I'd known how to water on clay I could have grown my best tomatoes there.

TO SUM UP: Pick varieties from seed catalogs or growers that have a reputation for being good; lean towards the F-1 or V.F. varieties; choose early varieties to counter our short season; transplant around Memorial Day; give all sun possible; mulch; water deep about once a week on sand or sandy loam and about every ten days to two weeks on clay.

### Annotations


Arnold Arboretum is celebrating its 100th anniversary this year. Mrs. Sutton's book is a tribute to the people who were most closely associated with the institution. Two men devoted their careers to the development of Arnold Arboretum: Charles Sprague Sargent whose botanical research field encompassed North America, and Ernest H. Wilson of whom Alfred Rehder in 1930 said: "He succeeded in collecting and introducing into cultivation a greater number of plants than any other collector." There are many familiar names to be met in this history — Gray, Bailey, Rehder, Faxon, Hooker, Olmsted. Mrs. Sutton draws the parallel between the development of Arnold Arboretum and the advancement of botanical research in the U.S. This well researched book is entertaining reading.

The Helen Fowler Library has been acquiring the *Time-Life Encyclopedia of Gardening*. There are 6 volumes: *Landscape Gardening, Roses, Annuals, Flowering House Plants, Lawns and Ground Covers, and Evergreens*. The illustrations are beautiful and numerous. There are also good indexes and charts denoting particular local requirements. One can note in the acknowledgements in the *Annuals* volume that Dr. Hildreth served as regional consultant.

The complete set of the *Audubon Nature Encyclopedia* has been received. This is in the juvenile reference collection but can certainly be used by anyone desiring basic information. Each entry begins with common names, followed by the scientific name and the family. The range and habitat, description of leaf, bark, flower and fruit complete the text on a particular plant. Each article has a bibliography of recommended reading. The illustrations are numerous and many are in color but they are not of the superior quality of the *Time-Life Encyclopedia*. The volumes are sturdily bound and should provide good reference material for all our patrons.

*S.H.*

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**approaches to INSECT CONTROL**

*J. W. Brewer*

Prior to the discovery of chemical pesticides man waged a constant, and frequently unsuccessful, battle against his insect enemies. Except for picking off the offending insects there was little early man could do to protect his plants. Perhaps early commercial approaches to control were based on magic, encantations, or witchcraft. If so, these methods were probably of little benefit except to the witch doctor who may have received some fee for his services. Sometime later, in the Asiatic countries, it was discovered that *Pyrethrum* flowers had insecticidal properties. Powder made from these flowers killed insects, and was not toxic to man, so it could be used against human lice. The powder was very expensive, supposedly equal in value to gold on an ounce for ounce basis. Obviously, then, this material was too expensive for control of plant insects. What could the farmers of the day do to protect their plants? Probably not much in the way of direct insect control. However, we find that many cultural practices adhered to because of tradition, actually do much to decrease insect problems.

Chemical control began on a practical basis with the use of arsenicals, like Paris green, but it wasn't until the early 1940's when DDT was discovered that this approach really came into its own. DDT was so effective, inexpensive and long lasting that it seemed insect control problems had been solved. Later, other chemicals supplemented DDT and in many situations non-chemical approaches to insect control were dropped. Some workers began to feel chemicals were the complete solution to insect pest problems. Recently, however, researchers have become increasingly aware of the possibilities that some pesticides and their residues may cause damage to our environment. The possibilities of such damage have encouraged many workers to reevaluate insect problems and to consider non-chemical control methods in an attempt to reduce pesticide contamination of the environment.

What are the means by which such contamination can be reduced? I think one reasonable answer will be a reduction in the amounts of persis-
tent, toxic pesticides used and, where chemicals are necessary, the substitution of safer, non-persistent materials. There are various ways of doing this. Let's look at some of them.

SOLUTION #1 - Legislative action banning use of selected, or all, pesticides.

You are perhaps aware of Colorado Senate Bill 27 introduced last year which was to prohibit the sale, use, and manufacture of organochlorine pesticides. Therefore, you may realize that this solution is more than just a possibility. Senate Bill 27 was withdrawn, but I am sure we can expect more of the same and eventually something of this nature will be passed. Workers in the insecticide industry feel certain that such legislation will be enacted. They also think that DDT and related organochlorine pesticides will be the first of a long line of prohibited materials. Needless to say, this industry is interested in other approaches to pest control as well as in less persistent and less toxic chemicals.

National legislation is currently being considered (Senate Bill 1021) that would essentially require classification of all pesticides into use categories. Only pesticides placed in a general use category could be applied by the homeowner. This category will probably include Malathion, Diazinon, Pyrethrins, etc. To apply other materials in the restricted use category will most likely require a license. This does not mean though that householders, farmers and gardeners, cannot get a license. This bill has been recently approved by the appropriate Senate committee and probably will be approved by both houses.

SOLUTION #2 - Restrict the uses of pesticides to the so-called essential uses (agricultural crop protection and disease control). What areas may not be considered essential? Protection of ornamental plants and shrubs seems a good guess to me, especially in metropolitan areas. Why?

First of all, the major contributors of pesticides into the environment are not farm areas as you might expect, but rather large, metropolitan areas. The evidence is such that there is little doubt that cities are putting great quantities of pesticides into the environment. Why is this so?

The farmer generally operates on a relatively small margin of profit. If 4 ounces of an insecticide will give control of a pest, he cannot afford to put on 5 ounces. He is careful on a per acre basis because of the large acreages and cost involved. Home owners, on the other hand, are not putting material on large acreages, but generally speaking they do put on greater quantities on a per acre basis. The cost of the material is not an important factor to the homeowner because of the small “acreages” involved. Other contributors to the metropolitan problem are the spray applicators who come into a yard on a routine basis and spray all plants whether infested or not. Certainly, unnecessary spraying on a large scale is a great factor in environmental contamination. On the other hand, if the spray applicators came into your yard, found no reason to spray (no insects) and left without unrolling the hose, they wouldn't get 50 feet down the street before their phone would be ringing. Even if they take the time to explain to the customer that spraying isn’t necessary, they have problems because the customer then wants a reduction in his bill. This then becomes a problem of public relations. I think the only answer is to reeducate the customer to the fact that spray applicators are selling a service, pest control and not spray material. The customer has to learn that spraying when no pests are present may be more of a problem than the pest itself.

A second reason for restricting use of pesticides in urban areas is that fairly good arguments can be made for the needs of pesticides on agricultural crops and disease control. The expanding world population certainly needs an ever increasing amount of food and the loss of agricultural chemicals would seriously reduce our food production capabilities. Pesticides are also an important weapon against disease carrying insects in many countries. Certainly the decrease in deaths due to malaria is direct evidence for the value of chemical control. It is much more difficult, however, to demonstrate the need for absolute insect control for landscape plants. Certainly the aesthetic value of a plant is impaired by insect damage, and this is important to the homeowner. However, there is considerable doubt in my mind as to whether or not the aesthetic value of a perfect plant justifies the quantities of pesticides used in urban areas. I believe that uses of pesticides in landscape situations will be the first area to be seriously restricted and that we must consider other control methods to protect these plants.

SOLUTION #3 - Use of other approaches to insect control.

As I have suggested above, the very first approach to insect control was probably to pick the offending bug off the plant. We call this the mechanical method of control and in its place it is very effective. It is most practical on the home owner level (that is for the home owner to do it) especially where only a few plants are involved. Mechanical control can be very effective. For example, the only good control for a pinyon pine borer, that I know of, is purely mechanical. It is necessary to dig the insect out of its burrow in the tree trunk with a knife. This is slow, and tedious, but effective. Webworms and tent caterpillars can also be controlled by simple removal: in fact, chemical control may be difficult because of the protective web. Control of the spruce gall aphid may be obtained by removing the new galls in the spring. Removing old galls also improves appearance of the tree but has no effect on the insects, which by then have gone. Light spittlebug infestations on ornamentals can generally be controlled with pruning shears. Mite and aphid populations can frequently be reduced by hosing the plants down with water. Trimming off dead or infested branches is still another effective mechanical control method. I think you will agree that some insect problems can be controlled, or at least reduced, by the home owner using the mechanical approach.

Another basic approach to pest management is called cultural control. This includes any practice that maintains plant health and thus reduces insect attack indirectly. The best prevention against attack by borers and bark beetles is to keep the plants in a healthy condition. As a general rule these pests attack only declining or dead trees. Proper spacing of plants
to reduce dense shading and humidity will do much to reduce slug problems. Cultivation under trees and shrubs in the fall will reduce the number of overwintering insects to a great extent. Just removing plant debris during winter will reduce overwintering sites of insects and will lower pest populations.

The use of insect resistant plants is another important cultural means of controlling insects. There are insect resistant varieties of several ornamental plants and it is useful to consider these when selecting plants. An example is the various varieties of honey locust. Insect resistance ranges from the very susceptible Sunburst variety to the resistant Morraine.

One of the most popular approaches to insect control, other than chemical, is biological. Biological control may be nothing more than the encouragement of naturally occurring control organisms (enemies) of the pest. If we are going to rely on biological control organisms, however, we will have to re-orient our thinking somewhat regarding the necessary level of control. Naturally occurring biological control methods cannot result in complete or absolute control because of the basic nature of the control mechanism. You can see that a successful, naturally occurring parasite or predator cannot afford to be too devastating because if so, it will completely destroy its food source. Therefore, biological control organisms cannot be too effective at their job, for the sake of their own survival. In most cases, a delicate balance has evolved between the host and predator (or parasite) such that both can exist in nature at the same time. Of course, when a pest (host) population becomes large, the predator (or parasite) may become very destructive and destroy 90-95% of the pest population but it will not completely eliminate it. On the other hand, control agents introduced from other countries, or areas, may be better control agents because they usually have not evolved the delicate relationships of the naturally occurring predators. Frequently, the introduction of a foreign predator will result in complete control of the pest organism. The predator then dies, of course, for lack of food. The problem here is that you have to keep reintroducing your biological control agent. You cannot establish it in most cases, and expect it to maintain itself because it does too good a job. It destroys its own environment (which may sound familiar).

A successful example of biological control is the Vedalia lady bird beetle introduced from Australia. This insect gives excellent control of cottony cushion scale in the citrus growing regions of California. Once introduced, the beetle maintained itself and did not have to be reintroduced, at least until the advent of chemical control.

Biological control organisms fall into three large groups. These are: predators, parasites and pathogens.

Predators capture and eat smaller, weaker, or less intelligent insects, often at a very high rate. They generally feed on a variety of insects and so may be effective against a wide variety of plant pests. Some common predators include the following:

Lady Bird Beetles. Both the adults and larvae feed on aphids, scales, mealy bugs, and insect eggs. They may be purchased in large quantities from several California firms. However, the beetles may disperse rapidly upon being released and may not be as effective as we might hope.

Syrphid Flies or Hover Flies. These insects are predaceous only in the larval stage. The adults feed only on nectar and probably do some pollinating. Many aphid colonies will contain one or several of these slug-like, tan or green maggots. The maggots grab the aphids with their mouth hooks, raise them in the air and suck out the body juices. Each larva will eat one aphid per minute for long periods of time. The adults lay the small white eggs in colonies of aphids, usually only one per colony.

Lacewings. Because of their feeding habits, lacewing larvae are frequently called aphid lions. The adults are generally not predaceous but the larvae feed on most soft bodied insects. They are so predaceous that they may even eat each other. Apparently to prevent this the eggs are laid on stalks so the first to hatch doesn't eat the other eggs. Lacewings (pupae) are commercially available.

Praying Mantids. Mantids are large insects with grasping front legs. Those legs are used to capture prey and hold it while it is being eaten. Although these insects are beneficial they probably are not as valuable as some of those mentioned above. Mantid egg cases may be purchased from various biological supply houses.

Parasites feed on insects also— as do predators, but frequently live inside the host as an internal parasite. Parasites are probably more effec-
tive at reducing populations of pest insects than predators. However, most parasites have a narrow host range so their effectiveness is restricted to one or at most a few pest species.

A part of my research program involves a needle gall on pinyon. This deformation is produced by a mosquito-like insect called a midge. This midge is controlled, in part, by a small wasp parasite, which develops inside the midge and kills it. If we could develop means of encouraging the parasite populations, chemical control measures might not be necessary.

The elm leaf beetle has been the object of interest in several biological control studies. A wasp parasite has now been established in California and is apparently maintaining itself. This same parasite has not survived, for some reason, in the eastern United States. A second parasite of the beetle, a Tachinid fly, has also been established in California. Although occasional defoliation still occurs in that area, the injury is not as general, or destructive, as occurred prior to parasite introduction.

Attempts have also been made to establish parasites of European elm scale and the smaller European elm bark beetle. Both have been only moderately successful thus far.

**Pathogens.** Insect pathogens (diseases) offer another promising means of biological control. A few insect pathogens have been developed commercially and some are presently being considered for registration. Pathogens are extremely susceptible to environmental conditions, however, and the level of control obtained varies a great deal.

Insect diseases may be caused by bacteria, fungi, or viruses. One bacterial species has been used successfully for control of the Japanese beetle in the eastern United States. Other species of bacteria have also been used against various insect pests. Several fungi, including red, brown and yellow species are said to give some control of white flies attacking Florida citrus crops. Unfortunately, most fungal pathogens require high humidity levels and so may not be very valuable here in Colorado. One type of virus has been used commercially to control the alfalfa caterpillar and other types are being tested against several insect pests.

Generally speaking, insect pathogens are quite specific in regard to the insects they will attack. Therefore, it becomes necessary to know the pest you are trying to control, otherwise your efforts may not be effective. Many failures of biological control agents are a result of attempts to control insects that are not hosts for the controlling agent.

The last type of control I want to mention — integrated control, isn't really a control method at all. Integrated control is merely the combination of two or more of the methods previously discussed, including the use of chemicals, so that specific insect problems are attacked in the most scientific way. If we keep these other control measures in mind, and apply them whenever possible, we can drastically reduce the amount of chemicals used without a great decrease in the level of insect control obtained. I felt, therefore, that the homeowner can make a substantial contribution to the reduction of chemical contamination of our environment.

**FOCUS on**

**Datura Arborea**

**IN THE**

**BOETTCHER CONSERVATORY**

Peg Hayward

Considerable confusion in nomenclature is evident concerning the genus *Datura*. This confusion dates back several hundred years and no taxonomist has attempted to clarify the contradictory descriptions of the various species for the layman. Nevertheless, the plant in the Boettcher Conservatory collection labeled *Datura arborea* L. attracts considerable attention when almost covered with pearly-white, trumpet-shaped flowers hanging like bells.

*Datura arborea*, angels trumpet, is a native of Peru. It is a member of the nightshade family, *Solanaceae*, which ranks high on the list of plant families that serve mankind. This family of dicot plants provides food plants including potato, tomato, and eggplant; poisonous and medicinal like deadly nightshade, henbane, and Jimson weed; several cherished ornamentals such as the petunia; and the notorious “weed” tobacco. The scientific name of the family is derived from the name of one of its genera, *Solanum*, which comes from the Latin word *solumen*, meaning quieting, alluding to the sedative properties of some of the species. Many members of the family produce alkaloids, which have a quieting effect, sometimes a permanent one. Possibly this is the answer to why the family is commonly known as the nightshade family.
Datura, a genus of contrasts from smelly weeds to lovely ornamentals, consists of 15 or more species of annual or perennial herbs, shrubs or trees. The generic name comes from the Hindu *dhatura* or *dhatu*. *Dhat* is the name of the poison derived from the plant, and the *Dhatu* were a gang of thugs who used the plant to stupefy or poison their intended victims. Linnaeus, who adopted the name *Datura*, felt that he should not use a barbaric name for a plant unless he could find a Latin root for the word. He came up with *dare*, to give, because *Datura* is given to those whose sexual powers are weakened.

*[Datura arborea]* is tree like as implied by the species name. It may grow to a height of 15 feet and it has a stiff irregular branching habit. The grayish-green leaves are 8 inches long, ovate-lanceolate, with entire margin. The leaves are borne in pairs, one a third shorter than the other. Immense trumpet-shaped flowers appear intermittently in spring, summer and fall. The corolla is about 17 cm. long, the 5 lobes being separated by a distinct sinus or gap.

Even though the leaves and seeds of the angels trumpet are poisonous, these plants are grown in the warmer regions as ornaments for their attractive pendulous flowers which open at night filling the air with an exotic musky scent.

Editor's note: Mrs. Hayward who wrote about the poinsettia in the last *Green Thumb* has received a report concerning current research on this plant. In this study one hundred and sixty rats (141 females, 19 males) showed no signs of toxicity or any apparent ill effects when given large doses of homogenates made from the leaves, bracts, or flowers of the poinsettia. Preliminary experiments with samples from the top and bottom of the plant, as well as dried material tests with doses as high as 50 g per kg, gave zero mortality. Courtesy *Ohio Florist’s Assn., Bulletin* No. 505, November, 1971.

Therefore, some reports on this subject indicate that the poinsettia is not poisonous taken internally as had previously been alleged. Our thanks to Professor K. L. Goldsberry of Colorado State University who called this information to our attention.

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How would you like to grow a Colorado blue spruce tree on your patio, or to have a Japanese maple, flowering shrub, pomegranate, or a tropical such as an orange tree blooming in your living room? The answer is *bonsai* — the art of maintaining in miniature form many types of plant life. The technique requires some skill, and above all much patience and perseverance. Dwarfing requires compression and control of root structures with compensatory pruning of the plant itself, usually daily watering, appropriate fertilization, and often controlled temperatures and light. Yet even an apartment-dweller can enjoy the growing of bonsai if desired.

To see some local examples of this ancient skill, Denverites are encouraged to visit the Second Annual Bonsai Show and Exhibit of the Denver Senior and Junior Bonsai Clubs which will be held at Horticulture Hall of the Denver Botanic Gardens on May 20 and 21, 1972.

*Bonsai* is an art form using living plants. *Bon* means tray, and *sai* means culture — or flat pot culture. Thus *bonsai* is a plant or tree cultured in a container. It is, therefore, small in size yet expressing the beauty and volume of a tree grown in a natural environment. *Bonsai* is essentially the art of choosing a plant having the necessary character, strength, and shape. This is then planted in a harmonious container, and grown with complete and constant love, and with affectionate care, so that it blends with the container and thus expresses a natural beauty in miniature. The illusion of space, of depth, and distance is thus created as well as a feeling of quantity and age.

A closely related art is *Bonkei*: *bon* again meaning tray, and *kei*, landscape or scenery. In this art form, other things are used in addition to one or more trees, such as rocks, gravel, moss, and so forth, to make a small-scale landscape.
Since bonsai is a Japanese word, many people are surprised to learn that this science is still practiced by the Chinese, who were probably the originators of this art. Nonkey T. Ishiyama, in his article Historical Notes on Japanese Bonsai provides some interesting information about the origin of the art of bonsai. When the Buddhist religion was imported to Japan from China about 1400 years ago, many earlier civilizations were imported at the same time. The drawing of pictures in the Sunie style was one. This style, which is still seen in Japanese drawings and done with only one color (usually charcoal, Chinese ink, or juice), showed steep, sheer canyons of rock, or rough, rocky places at the top of mountains where there were few trees. The start of Japanese gardens was in copying these pictures and making them come to life. The first Japanese bonsai were quite large, planted in wooden boxes and kept out-of-doors in the garden, and called hachi-no-ki or tree in pot. The name bonsai began after the Meiji period, which started 104 years ago in 1868.

Yoji Yoshimura, instructor of Bonsai at the New York Botanical Garden has said that the history of bonsai, both in China and Japan, may have started a long time ago, but the progression to an art has been only about 150 years. During the past 15 years, bonsai as an art has expanded to places outside of Japan, including many places in America.

Now, what of bonsai in the Denver area? On January 1, 1954 a group of Japanese friends were attending a New Year's party at the home of Shuichi Fukuhara. Everyone present was admiring his Japanese plum tree which was blooming in all its glory. Mr. Fukuhara suggested that it might be fun for them to meet together and learn more about bonsai. Some ten of his friends were in hearty agreement. After several meetings, this group decided to form a bonsai club and 32 charter members joined together to form the Denver Senior (Issei, or first generation) Bonsai Club. Their first Bonsai Show was held at the Japanese Community Hall in 1954. A second show was held the following year at the Buddhist Church, and a bonsai show has been held at some location in Denver for each of the past 17 years. The Issei club still has 25 active members and meets monthly at various member's homes. The oldest living member of this group, Roy Suehiro, is 89 years young, and his vigor, spryness, and radiant smile are a constant source of inspiration to those who are privileged to know him.

When the Senior Bonsai Club was holding its annual show at the Simpson Methodist Church on November 19, 1969, one of the members of this church, Leo Murakami, thought that some of his generation (Nisei, or second) should be learning something about the bonsai art while the Issei members were still alive and willing to teach them. He posted a paper on the door on which anyone interested might sign his name and address. There were two persons who signified their interest by signing the list, and 60 of these attended the initial meeting. This meeting culminated in the formation of the Denver Junior Bonsai Club with 35 charter members. The group met monthly at the Simpson Methodist Church with George T. Fukuma, a member of the Senior Club, serving as the sensei (teacher) to instruct them in the basic principles of bonsai. With arrival of spring, the members' intense interest and overwhelming desire to start planting trees of their own suggested the advisability of meeting twice each month. The Junior Club has continued to meet on the first and third Tuesday of each month since that time. Information about the Denver Junior Bonsai Club may be obtained from Marthena Cavnar, 7202 W. Cedar Circle, Denver. Colo. 80226 (233-0995).

The Junior Club admits it has a long way to go to catch up to the Senior members, several of whom have 200 to 500 bonsai trees each. One Issei member has a tree estimated to be 1000 years of age. The enthusiasm and interest of all members continues to grow; each rejoices with a success, and mourns every loss just as a parent mourns the death of a child. Success in bonsai requires constant attention, care, and love — affection as you would give your own child. Proper soil, adequate water, necessary fertilizer, essential sunshine or shade, and periodic pruning, wiring, and repotting are required for each and every plant. The need for devotion to this art is quite apparent.

The Japanese regard their bonsai with great reverence, as the story of the acquisition of the "Fudo", after eight months of negotiation and communication by the Brooklyn Botanic Garden, will demonstrate. The "Fudo" is a Chinese juniper (Juniperus chinensis var. sargentii) with an estimated age of 600 to 1000 years — probably the oldest living plant ever shipped to America — which was recently acquired by the Brooklyn
Botanic Garden from Kyuzo Murata's Nursery of the Nine Mists in Omiya, Saitama Prefecture, Japan. Mr. Murata is said to have desired to keep this fine tree in his private collection as long as he lived. Nor was it easy for the townspeople to see this prestigious specimen go to another land. But, after months of thoughtful consideration of the increasingly harmful effects of air pollution to trees in the garden, the immense value of having Americans exposed to appreciation of this rare example of the bonsai art, and the fine care it would be given by the staff of the Brooklyn Botanic Garden, the owner finally decided that the people of the United States should have the opportunity to enjoy this priceless tree. Mr. Murata is alleged to have felt that he was giving his own daughter to an American to be joined in marriage.

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Mrs. James C. Syner
Mrs. Carl W. Tempel
Mrs. Frances Tennant
Mrs. T. D. Thompson
Mrs. Margaret Watson
Mrs. R. S. Welty
Mrs. M. H. Wild
Mrs. Rose C. Zanit

Herbarium Volunteers & Herbarium Committee

Mrs. Fred Zeiner, Chairman
Mrs. Walter Ash
Mrs. Calvin Fisher
Mrs. Samuel Heacock
Mrs. Marjorie Shepherd
Mrs. F. Richard Yeatts

Horticultural Advisory Committee

Mr. Kenneth G. Wilmore, Chairman
Mr. Ralph Becker
Mr. Alfred J. Bronnfield
Dr. John R. Durrance
Dr. A. C. Hildreth
Mr. Chris Moritz
Mrs. Jane Silverstein Reis
Dr. Moras L. Shubert
Mr. Harry Swift
Mr. Ken Watson

Library Committee
Miss Lucy M. Crissey, Chairman
Dr. A. C. Hildreth
Mrs. G. B. Morrison
Mr. Henry J. Shearouse
Mrs. James White
Mrs. Earl Wilson
Library Volunteers
Mrs. Thelma Bowles
Miss Lucy M. Crissey
Mrs. Mary Jane Downing
Miss Geneva Eldridge
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Miss Rachael Hauck
Mrs. William Holland
Mrs. Gordon Hollis
Mrs. Bruce Jackson
Mrs. Mary Lederer
Mrs. Richard Millard
Mrs. Peg Milrcy
Sister Patience
Mrs. Margaret Polak
Mrs. John P. Warden
Mrs. James White
Mrs. Earl Wilson
Mrs. Robert H. Zeis

Lobby Court Committee
Mrs. J. Kernan Weckbaugh, President
Mrs. Donald C. Campbell
Mrs. Frank B. Freyer, II

Plant Sale Volunteers
Chairman: Mrs. Ted Washburne
Co-Chairman: Mrs. John F. Falkenberg
Annuals: Mrs. C. P. Smith
Berry Basket: Mr. Maynard Jacobson
Children's Booth: Mrs. Axel Sjogren
Geraniums and Patio Plants: Mrs. Keith Robinson and Mrs. John Clifford
Herbs and Vegetables: Mrs. Joseph Broughton and Mrs. D. H. Rydstrom
Houseplants: Mrs. Robert Welty
Perennials: Mrs. Phil Hayward
Rock Garden and Ground Covers
Mrs. Walter Ash and Mrs. J. V. Petersen
African Violets
Ms. Sybil Bates
Shrubs and Trees: Mr. Kenneth G. Wilmore
Books: Miss Lucy M. Crissey
Cashiering: Mr. Charles Wilkins
Customer Service
Mrs. Alexander L. Kirkpatrick
Mrs. Robert LaMassena
Mr. Ralph Hargreaves
Gift Shop: Mrs. Mary A. Secrest
Gift Shop Annex
Mrs. G. B. Morrison
Mrs. Robert M. Kosanke
Information — Checkstands
Mrs. Campbell Robertson
Membership: Mrs. Loring Brock
Signs: Mrs. Robert Putsch
Terrace and Garden Tour
Mrs. Donald Robotham and Mrs. William Stanley

The Denver Botanic Gardens
ANNUAL REPORT
for
1971
comprising a separately paged part of
The Green Thumb magazine
1971
PRESIDENT'S REPORT
Denver Botanic Gardens

It is a pleasure to report to the members of Denver Botanic Gardens on the events and progress of the year 1971. It has been a year of great activity at the Gardens in the development of both program and physical facilities.

Appropriate it is, first, to mention the many people who have been involved in this activity, including the Board of Trustees, the officers, the City Administration, the staff, and the hundreds of devoted volunteers. The Trustees have acted with interest and wisdom in their planning for the development of the Gardens and, of course, have been very active in raising the necessary funds to accomplish these plans. The City Administration not only has provided its moral backing but also has continued its vital support in the form of the operating budget. The staff, under the leadership of Dr. William G. Gambill, Jr., Director, and Mr. Andrew R. Knauer, Assistant Director, have diligently executed the development plans as funds have become available and have put into effect the gradually expanding educational and display programs. Other members of the staff working closely with them have shown a high degree of support of our purposes.

The volunteers are in a class by themselves, and we would be far short of the position we have reached if we had not had their great dedication assisting us along the way. The countless hours of voluntary time devoted to Denver Botanic Gardens by these groups, the Denver Botanic Gardens Associates, the Denver Botanic Gardens Guild, the Around the Seasons Club, are greatly responsible for our progress. The estimated 11,000 volunteer hours contributed in the operation of the Gift Shop, for example, not only add to the attractions at the Gardens but also have contributed substantial funds toward special projects and the general operating budget. A voluntary committee, also, from the Garden Club of Denver has ably assisted in the changing exhibits in the Lobby Court Garden, which provides such a beautiful entrance to the Conservatory and to the Education Building.

A significant accomplishment during the past year has been the attainment of the $850,000 goal of Phase II of the Development Fund. Through the efforts of a great many people $855,000 has been contributed or pledged to this fund. An impressive part of this amount, $242,430, has been contributed or pledged by the Board of Trustees as a group, including every member during the past three years.

The long range plan for the development of the York Street Gardens is being put into effect as funds are received from the Development Fund drive. Accomplished to date have been the Master Plan, itself, for the development of the York Street Gardens as prepared by Eckbo, Dean, Austin & Williams, the purchase of the LaJolla Apartments and additional property in the block to the north of the Boettcher Memorial Center, the completion of virtually the entire water-oriented system this past fall, the construction of the York Street gates and gatehouse, and a modest addition to the Endowment Fund. In addition much of the furnishing of the Education Building has been made possible. As more pledges are paid and, hopefully, additional contributions, made, execution of the Master Plan will continue.

No one and no thing can escape the effects of the inflation which has gripped this country in recent years. Cost estimates made three to four years ago for parts of the Master Plan have proven inadequate in this situation, and it has become necessary for the Board of Trustees to seek supplemental funds for remaining features. Most important and primary at this time is the construction of the major paths, walkways and roads throughout the Gardens to provide access to them and permit the resumption of planting of botanical material, hopefully later this year. Currently the board, divided into three teams, is engaged in a friendly "War of the Roses" to raise an additional $100,000 for this purpose. The goal is not yet in sight, but there have been some encouraging developments. It is hoped that this construction can be completed this spring. Other construction under way or expected to be accomplished at the same time is a major part of the service area to the northwest of the Conservatory and the completion of foundations and footings, to the extent of available funds, for the two additional greenhouses in that same area. This work is being carried out through the use of limited funds provided by the capital improvement budget of the City & County.

We record with sorrow the loss of two members of the Board of Trustees, Mr. J. Clinton Bowman on October 27, 1971, and Mrs. Charlotte Barbour on December 29, 1971. We will miss their counsel and their association with us in accomplishing projects in the planning of which they shared.

New trustees have been elected to the board as follows:

Mr. Ralph Becker
Mrs. John Brooks, Jr.
Mr. Alexander L. Kirkpatrick
Mrs. Howard Rea
Mrs. David S. Touff

Again my many thanks to the Mayor and Council of the City & County of Denver, the officers, the trustees, the staff, and the volunteers for a most successful 1971.

Respectfully,
John C. Mitchell
President

1971
DIRECTOR'S ANNUAL REPORT

Introduction

The year 1971 was unquestionably one of the busiest and most productive ones in the history of the Denver Botanic Gardens. The opening of the Education Building resulted immediately in a rapid expansion of the activities and educational program sponsored by the Botanic Gardens. Substantial and consistent progress in the reconstruction of the outside gardens according to the Master Plan has brought the completion of the new gardens closer to reality. Addition of new staff members helped the Botanic Gardens move forward significantly in many aspects of its program. Numerous improvements were carried out in the already existing facilities of the Botanic Gardens. Memberships in the Botanic Gardens showed a very encouraging upswing. And exciting new plans for the future were set in motion.

Staff

In 1971 a Director and an Assistant Director were at work together at the Botanic Gardens for the first time in a number of years. Twenty-one permanent staff members were on duty out of a total of 23 provided for in the table of organization of positions funded by the City and County of Denver; 6 temporary, seasonal workers paid by the City worked at the Gardens during the busiest part of the season. Nine persons were hired as part-time employees by the Denver Botanic Gardens, Inc.
positions included the secretary for the Development Fund and for publicity and public relations, the operator of the label-engraving machine, the Instructor in the Children’s Garden, the professionally trained Assistant Librarian, weekend clerks in the Gift Shop, the Editor of The Green Thumb, and the custodial worker for the Botanic Gardens House. For the first time, the Botanic Gardens had the full-time services of an Educational Director (Horticultural Education Specialist), a professional Librarian, and a Grounds Foreman.

Attendance at the Gardens

After the opening of the Education Building in March, 1971, records show that 18,212 persons attended meetings held there by botanical, horticultural, conservation, and other groups. Classes held in the new building attracted 6,250 persons. Special events, primarily plant shows, attracted 25,756 visitors to the new facilities offered in the building. Nearly 210,000 persons passed through the counting turnstiles in the foyer of the Conservatory. Meetings of plant and conservation-oriented groups in the rooms of Botanic Gardens House attracted another 4,522 participants in 1971.

The Education Building

The doors of the Education Building, the newest addition to the Boettcher Memorial Complex, were opened to the public in the first week of March, 1971. The Education Building, as it is generally called, provides the following facilities for the Botanic Gardens: Horticulture Hall, an auditorium with a stage at one end and with seats for nearly 500; a Plant Preparations Room adjacent to Horticulture Hall; the Helen Fowler Library; the Kathryn Kalmbach Herbarium and the Herbarium Display Area; the Lobby Court with its fountain, pool and display area surrounding the pool; three rooms designated as Lecture Rooms or Classrooms; a Research Laboratory; a Dark Room and storage rooms.

Lobby Court Displays

Opening with a stunning display of flowering hyacinths in three colors over-topped by young white birch trees at the time of dedication, the Lobby Court Garden Area featured the following plant displays during the year: Succulents and cacti; Easter lilies with flowering primulas; “Bonsai plants”; tuberous begonias; azaleas; rhododendrons. The Garden Club of Denver has provided generous financial support for these displays, and a committee from that club has worked closely with staff members of the Botanic Gardens in planning the displays.

Horticulture Hall

The availability of this handsome auditorium has made possible the scheduling of numerous activities which are reflected in the following facts and figures. The following shows were held in Horticulture Hall in 1971 after its opening in early March, and the estimated attendance at each is indicated: Rocky Mt. African Violet Show, 2,500; Ikebana International Show, 3,000; Bonsai Clubs of Denver, 1,500; Iris Flower Show, 2,000; Colorado Water Color Exhibit, several thousand; Gloxinia Gesneriad Growers Show, 2,000; Colorado Gladiolus Show, 3,000; Children’s Garden Fair and Graduation, 500; Orchid Show, 2,000.

Various organizations have held regular or special meetings in Horticulture Hall for large groups in 1971. Among them were the following: Colorado Nursery and Shade Tree Conference, CSU Landscape Management Workshop, Denver Rose Society, Dahlia Society, Iris Society, Rocky Mt. African Violet Council, Colorado Mountain Club, Ikebana International, Sierra Club, Children’s Garden, Garden Club of Denver, Denver Botanic Gardens Annual Plant Sale, Denver Botanic Gardens Annual Christmas Sale, Bonsai Clubs of Denver, “We Care”, Colorado Mycological Society, Colorado Gladiolus Society, Historic Denver, Rocky Mt. District Rose Judging School, Junior League of Denver, National Junior Horticulture Association, Young Audiences.

Public Lecture Series

Free public lectures were scheduled in Horticulture Hall in the spring and autumn months in 1971. The following persons were included on the 1971 lecture schedule: February, Dr. William G. Gambill, Jr., “Is There a Botanic Garden in your Future?”; March, Mr. and Mrs. Vernon Tompsett, “Colorado Wild Flowers” and “Flower Interlude”; March, Mrs. Ann Zwinger, “Constant Friendship”; April, Dr. George Williams, “Responses of Woody Plants (Including Aspen) to Environmental Conditions”; May, Dr. F. L. S. O’Rourke, “Flowering Trees of the World”; June, Dr. James Feucht, “The American Elm: A Plan for Survival”; October, Dr. Helen Marsh Zeiner, “Wildflowers — Getting to Know Them”; November, Dr. and Mrs. Gordon Alexander, “A Garden Tour in Britain”; December, Dr. J. W. Brewer, “Approaches to Insect Control”.

Courses of Instruction Offered

Since one of the primary functions of a botanic garden in a large metropolitan area is educational, the Denver Botanic Gardens made significant progress toward that goal by offering several types of courses in 1971. The following courses were offered for a ten-week period (approximately one academic quarter) by the staff member or guest instructor indicated:

- Tropical Plants for House and Garden, Bibe, 3 qrs.;
- Home Landscape Design, Knauer, 1 qr.;
- Identification of Trees and Shrubs — Gymnosperms, Gambill, 1 qr.;
- Spring Flora of Denver and Vicinity, Gambill, 1 qr.;
- Flower Arrangement for Beginners, Mrs. Robert Kosanke, 1 qr., also 5 weeks in summer;
- Bonsai for Beginners, George Fukuma, 1 qr.

The Community College of Denver offered a course in the fall quarter entitled “Floral Design Workshop”. Taught by Mr. Lee Ashley, the course offered 6 hours of college credit, and approached the principles of floral design and the operation of a flower shop from the vocational standpoint.

The Denver Public Schools again offered a summer botany course for high school students, for credit, at the Denver Botanic Gardens. Entitled “Botany Seminar and Field Study”, the course was taught by Mr. William Bollacker of the George Washington High School faculty.

Numerous short courses lasting for a half-day or less were offered during the year by staff members as follows: “Pruning of Trees and Shrubs”, Knauer; “Lawn Care”, Knauer; “Hanging Baskets — Eye-Level Gardening”, Blades; “Suburban Vegetative Gardening Techniques”, LeMay; “Annual Garden Flowers”, Pincoski; “Summer Care of Roses”, Knauer; “Dividing and Transplanting Perennials”, Knauer; “Field Trips in Identification of Woody Plants of the Denver Area”, Gambill; “Preparing Garden Soil”, Knauer and Schell; “Preparing your Garden for Winter”, Knauer.

The Children’s Garden

One of the more successful educational projects of the Denver Botanic Gardens is the Children’s Garden. In 1971 approximately 130 youngsters in ages from 9-15 took part in this program. Beginning with a series of instructional classes on a wide variety of topics pertinent to preparing, planting and maintaining a garden, these children planted and grew vegetables and flowers in individual plots of approximately
100 square feet. A Garden Fair for the public and “Graduation” ceremony climaxed the successful season in September. Mrs. Irene Vittetoe serves as Instructor in the program, and supervises the children’s work in the gardens with the aid of a number of loyal volunteers, and, of course, the parents of the children. Beverly Pincoski is the staff member who directs and correlates the Children’s Garden program.

Open Garden Day

Open Garden Day was held at the Botanic Gardens on Sunday, October 10, from noon until 4 p.m. to permit visitors to inspect the progress that has been made in the reconstruction of the outdoor gardens on York Street. Phase I of the master plan was complete at that point. The 17 acres of the outdoor gardens has been reshaped from a nearly flat surface into a succession of mounds, depressions and partially enclosed areas. An extensive underground frost-free irrigation system has been installed, and a very handsome surface ornamental waterway has been completed featuring fountains, channels, sluices, spils and waterfalls, as well as four 15-foot pylons from which the water gushes to start its way along the system. The ornamental water system was turned on especially for the occasion. Volunteers, Trustees and staff members guided over 5,000 visitors along a pathway marked with brightly-colored ribbons and balloons, on a perfect “blue and gold” autumn day. Visitors were also invited to inspect the Conservatory and the new Education Building. The public came, saw, and appeared to be delighted by what they saw; certainly those present had a much better understanding of what has been going on behind fences and gates for so many months. Additional such occasions are planned for 1972, to keep members, friends and new visitors informed of the progress being made in building a magnificent new garden.

Wild Flower Field Trips

In cooperation with Dr. Brunquist, Curator of Botany at the Denver Museum of Natural History, the Botanic Gardens offered biweekly field trips to various points in the Denver area to study plants in the field, particularly wild flowers. These trips began the first of March and were terminated at the end of September, and were very well attended. Dr. Helen Marsh Zeiner of the Denver Botanic Gardens volunteer staff shared leadership of the trips with Dr. Brunquist, as did various other persons, on occasion.

Memberships

As of January 1, 1972, the total number of all memberships in the Denver Botanic Gardens stood at approximately 1,700. This represented an increase of about 600 members in all categories during the calendar year of 1971. Although this increase is gratifying, there is, almost certainly, a potential membership of several times that number in the Denver Metropolitan Area. Plans are being laid to mount a special membership campaign in 1972.

During the past year the Board of Trustees authorized an increase in the annual dues for the regular membership from $5.00 to $7.50. This action was based on the fact that generally increasing costs had brought the Botanic Gardens to the point at which $5.00 was inadequate for maintaining an annual membership. As of January 1, 1972, new regular memberships were raised, therefore, to $7.50. Renewals of regular memberships were to be raised to $7.50 as of April 1, 1972. Fees for other memberships were set as follows: Participating Membership, raised from $10.00 to $15.00; Supporting Membership remained at $25.00; Contributing Membership remained at $50.00; and Sustaining Membership remained at $100.00.

Two new types of memberships were instituted as a result of Board of Trustees action in 1971. The Junior Membership, for persons up to 16 years of age, was set at $2.00 in 1971, and has been raised to $2.50 as of January 1, 1972. All those who completed the Children’s Garden program in 1971 were awarded this membership, and thus they became the first class of Junior Members. The membership is open to all young people of the age range indicated. A bimonthly newsletter for Junior members was initiated, and christened The Jolly Green Gardener following a contest among the members.

A new membership for Business and Educational Institutions was set up at $100.00 a year to permit business firms and educational institutions to help underwrite and participate in the program of the Denver Botanic Gardens.

The Helen Fowler Library

Under the capable direction of Mrs. Solange Huggins, Librarian, and with the loyal cooperation of a volunteer committee headed by Miss Lucy M. Crissey, the Helen Fowler Library achieved unparalleled growth and development during 1971. The Library moved to its handsome new quarters in the Education Building in March, 1971. Here it attracts many visitors and patrons, and it is rapidly becoming one of the most successful operations at the Denver Botanic Gardens. The Library is open to the public a total of 52 hours per week, and seven days each week (Monday through Saturday, 9 a.m. to 5 p.m., Sunday, 1 p.m. through 5 p.m.). In 1971 a total of 1866 books was circulated. The number of books added to the collection in the past year was 441, of which 198 were purchased and 243 were gifts. Thirteen journals were added in 1971, of which four were gifts. A total of 23,904 persons visited the library in 1971, while the number of persons using the library was 6,953.

The James J. Waring Rare Book Room was completed and forms a valuable addition to the library facilities. Rare books from the Helen Fowler Library have been placed in the room, which is provided with automatic temperature and humidity controls. The Waring collection of rare botanical books is being moved to this facility. The children’s collection was established in the Library in 1971. Books from the general collection, of special interest to young gardeners were segregated and became the nucleus of the collection to which more than forty new books were added.

Very welcome financial support was made available when the Associates of the Denver Botanic Gardens pledged a contribution of $100.00 per month to the budget of the Library, beginning in October, 1971. The Helen Fowler Library now contains somewhat in excess of 3,500 books and 135 periodicals.

Publications

Beginning with the January, 1971 number of the Green Thumb Newsletter, the editorship was transferred to the Education Specialist as a duty of that office. (Mrs. J. V. Petersen, who had served as Editor so capably for a long period of time, asked, earlier, to be relieved of her duties.) Mr. James Schell, who joined the Botanic Gardens staff as the first person to occupy the position of Education Specialist, served as Editor until he left the Botanic Gardens in October, 1971, to begin work on his Ph.D. degree at Kansas State University. With the February number, the format of the Newsletter was changed from a 2-page size to a 4-page size. This was necessitated primarily by the somewhat precipitate expansion of the monthly calendar of activities at the Denver Botanic Gardens following the opening of the Education Building.

At the end of 1971, with the appointment of Miss Margaret Sikes as the new Education Specialist, the editorship of the Green Thumb Newsletter became her responsibility. With the July, 1971 issue, Dr. James Feucht, Metro Denver Area Horticulturist...
on the staff of Colorado State University agreed to write the portion of the Newsletter which offered the monthly "Gardening Tips". His regular monthly contribution has added a great deal to the Newsletter, and the Denver Botanic Gardens is grateful for his assistance.

The Green Thumb, quarterly magazine of the Denver Botanic Gardens was edited by David Blades, Assistant Superintendent of the Conservatory, until mid-May, 1971. At that time Mr. Blades asked to be relieved of the editorship because of the pressure of his other duties. Miss Margaret Sikes was appointed as Editor, and took over the position in late May with the Spring issue of the quarterly. Upon her appointment as Education Specialist in December, she agreed to remain as Editor of The Green Thumb until a replacement could be found. In 1971 the quality of the contents of The Green Thumb was maintained at a very high level, despite the tribulations endured by the staff of the quarterly with a change in publisher.

The Conservatory Plant Guide was revised completely during the past year, and the new edition appeared in August, 1971. The revision was not published as an issue of The Green Thumb, as was the case with the original edition, but appeared as a separate publication. Mr. Phil H. Hayward served as Editor and chief contributor of the new edition; Dr. A. C. Hildreth, Dr. Helen Marsh Zeiner and Mrs. J. V. Petersen were Editorial Assistants. Mr. Phil Hayward designed the very attractive cover and also drew the plant illustrations in the book.

The Conservatory Guide lists the common name, botanical name and plant family of 100 plants growing in the Botanic Gardens Conservatory. Characteristics useful in the identification of each plant as well as a few facts of general interest to the layman are also provided. A map is included showing the location of each plant in the Conservatory, making it possible for the visitor to guide himself through the Conservatory. The Guide is available at the door of the Conservatory for 50 cents per copy.

Kathryn Kalmbach Herbarium

The Kalmbach Herbarium was moved from Botanic Gardens House to spacious new quarters in the Education Building in February, 1971. The size of the Herbarium was doubled (it now stands at somewhat over 10,000 sheets) when the Herbarium of Denver University consisting of more than 5,000 sheets was transferred to the Denver Botanic Gardens and incorporated with the 5,000 sheets of the Kalmbach Herbarium. Twelve herbarium cases are now used in housing the collections which continue to grow in number and usefulness. An interesting addition to the Herbarium was the arrival of a collection of 150 specimens from Denmark sent to Dr. William Gambill in the form of an exchange by Dr. Jørgen Jensen of Copenhagen.

The Herbarium is open to the public one day each week, and can be used by appointment on other days. Dr. Helen Marsh Zeiner, as Chairman of the Herbarium Committee, is in charge of the collections. The Herbarium Display Area, on the balcony outside the Herbarium room and overlooking the Lobby Court features a display of named living plants of current interest, particularly plants which are currently in bloom in the Denver area. This display is open to the public each day.

The Mycological Society of Colorado

The new Research Laboratory on the lower level of the Education Building, is the center of activity in a long-range research project of the Colorado Mycological Society. Heading the project, and serving as its chief researcher is Dr. D. H. Mitchel, prominent Denver physician and coauthor of the publication, Mushrooms of Colorado and Adjacent Areas with Mary Hallock Wells (published by Denver Museum of Natural History). The laboratory is being used for detailed taxonomic studies on the fleshy fungi and, more recently, the slime fungi of Colorado. The Herbarium of the Mycologi-
3. Office for Horticultural Education Specialist provided by remodeling former Gift Shop storeroom, providing it with new lighting, carpeting and furniture. Office space for secretary to Education Specialist provided by revamping small area off the foyer and enclosing it with a "divider".

4. Rewiring of portions of the Conservatory, contracted by Kennedy Electric Co. with funds from City Budget. This represents the first phase of relocation and replacement of portions of the Conservatory wiring system.

c. Landscaping around Education Building
1. Planned by and executed under the supervision of the Horticultural Advisory Committee, and with the aid of a generous grant from the Associates of Denver Botanic Gardens in the amount of $5,000.00.
2. Attractive plantings utilizing the following plants were made: golden- rain tree; "Skyline" thornless, podless honey locust; Shuber choke- cherry; river-birch; bristle-cone pine; eastern white pine; pinyon pine; "Tammy" juniper; evergreen mountain mahogany; compact orange grape; "Koreanspice" viburnum; "Manhattan" euonymus; "Wyatt" firethorn; "Katherine Dykes" potentilla; cranberry cotoneaster; spreading cotoneaster; cut-leaf sumac; bald cypress.

d. Deep Frames and Propagation Beds
1. Construction of five deep frames, both insulated and heated, to use as hot frames in winter and moist frames in summer, along north fence of Botanic Gardens, opposite Conservatory.
2. Construction of nine open nursery beds separated by paved paths and with irrigation outlets to each bed, along north fence of Botanic Gardens opposite Conservatory.

Acknowledgments
During the course of the year, the Director has worked closely with a large number of volunteer helpers in addition to members of the staff. In an attempt to recognize these persons individually, the names of volunteers are being printed elsewhere in this report. If some names are inadvertently omitted, the Director will appreciate having them called to his attention. Where so many persons are involved, errors of omission may occur, and if this has happened we are very sorry. The Director wishes to take this opportunity to express his deep gratitude for the fine cooperation he has received during the past year from members of the Board of Trustees, Staff members, and volunteers.

Special thanks are due also to Mr. Joe Ciancio, Manager, Department of Parks and Recreation; Pat Gallavan, Director of Parks; David Thibault, Administration Officer; and Norma Williams, Personnel Officer. These persons have been helpful in many ways during the year, as have other members of the staff of Parks and Recreation.

DENVER BOTANIC GARDENS FOUNDATION, INC.
909 York Street
Denver, Colorado

BALANCE SHEET
December 31, 1971

Cash Accounts:
Checking Accounts
Savings Accounts
Tax Reserve, Etc.

Other Assets:
Real Estate
Conservatory
Education Building
Master Plan Development
Greenhouse
Deposited on Land (Restricted)
Equipment Owned

TOTAL

EQUITY ACCOUNTS

Liabilities:
Notes Payable
Rent Deposits

Fund Accounts:
Represented by Cash
Represented by Other Assets

TOTAL

ACCOUNTANT'S OPINION

We have examined the above balance sheet and related statements of cash receipts and disbursements and fund balances for the year ended December 31, 1971. The examination was made in accordance with generally accepted auditing standards and accordingly included such tests of the accounting records and such other procedures as were considered necessary in the circumstances.

In my opinion, the accompanying balance sheet and statement of cash receipts and disbursements present fairly the financial position of the Denver Botanic Gardens Foundation, Inc. at December 31, 1971 and the related cash receipts and disbursements for the year then ended.

J. D. Vander Ploeg
Certified Public Accountant
DENVER BOTANIC GARDENS, INC.
A Non-Profit Organization

OFFICERS
Mr. John C. Mitchell ........................................... President
Mr. Harley G. Higbie, Jr. ......................................... Vice-President
Mr. Charles C. Nicola ........................................... Vice-President
Mrs. James J. Waring ........................................... Vice-President
Dr. Moras L. Shubert .......................................... Secretary
Mr. Richard A. Kirk .......................................... Treasurer

STAFF
Dr. William G. Gambill, Jr. .................................. Director
Mr. Andrew R. Knauer ........................................ Assistant Director
Mr. Ernest A. Bibee ........................................... Conservatory Superintendent
Mr. David A. Blades .......................................... Assistant Conservatory Superintendent
Miss Beverly M. Pincoski ..................................... Botanist-Horticulturist
Miss Margaret Sikes .......................................... Education Director
Mrs. Solange Huggins ......................................... Librarian
Dr. A. C. Hildreth ............................................. Director Emeritus

TELEPHONES
Denver Botanic Gardens ...................................... 297-2547
Conservatory Superintendent ................................ Ext. 21
Education Specialist .......................................... Ext. 23
Library ................................................................. Ext. 24
Gift Shop ............................................................. 297-2348

ILLUSTRATION SOURCES
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Page 46 – Photo courtesy George J. Ball, Inc.
Pages 52, 53 – Drawings courtesy J. W. Brewer
Page 55 – Drawing by Phil Hayward
Pages 58, 59 – Photos by George Crouter
Page 61 – Drawing by Suzanne Ash
A botanic garden is a collection of growing plants, the primary purpose of which is the advancement and diffusion of botanical knowledge. This purpose may be accomplished in a number of different ways with the particular placing of emphasis on different departments of biological science.

The scientific and educational work of a botanical garden centers around the one important and essential problem of maintaining a collection of living plants, both native and exotic, with the end purpose of acquisition and dissemination of botanical knowledge.