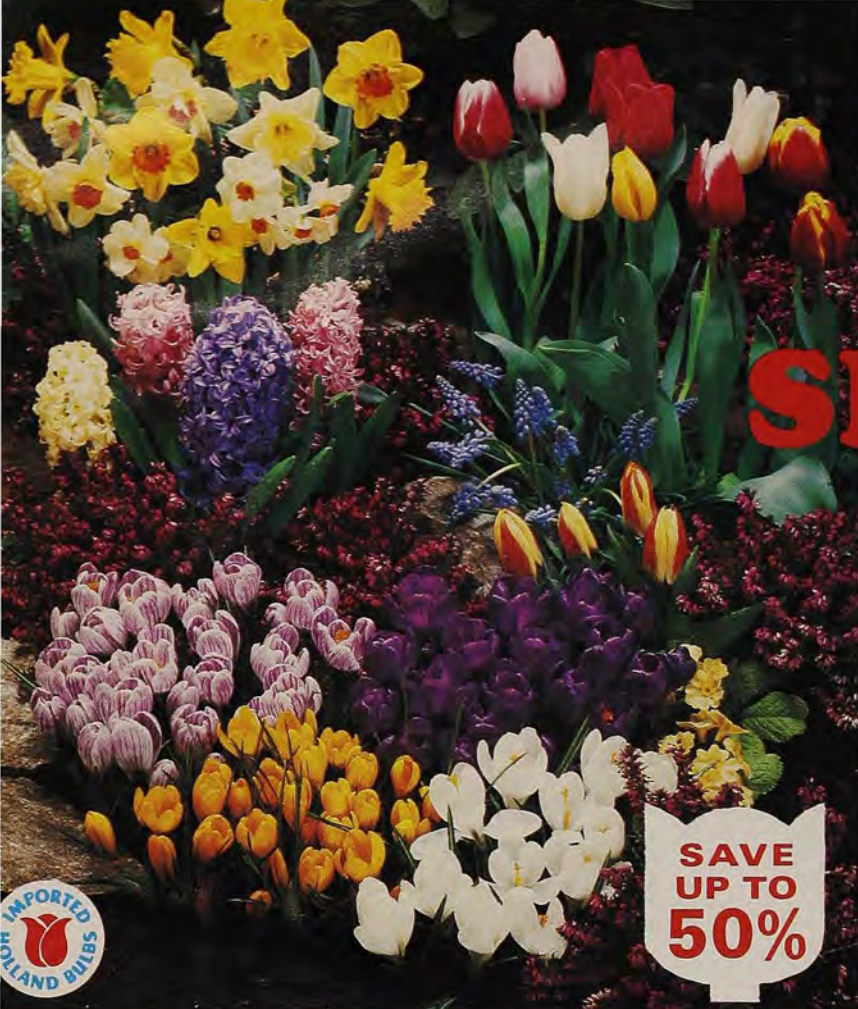


August 1984

American Horticulturist

The background of the cover is a detailed photograph of large, dark rocks heavily covered in various types of moss. The mosses exhibit a range of colors from vibrant yellow-green to deep forest green, with some areas appearing more textured and others smoother. The lighting creates strong highlights and shadows, emphasizing the rugged texture of the rocks and the delicate growth of the moss.



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Beautiful flowers, fresh green leaves, a terrestrial habit and a preference for cool temperatures characterize disa orchids. For more information on this summer-blooming greenhouse plant, turn to page 13.

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On the Cover: It is not often that we have the opportunity to see a garden through the eyes of its maker, but in this issue, Polly Hill takes us on a tour of her own Martha's Vineyard garden—Barnard's Inn Farm. Salt-blackened, shingled buildings and beautiful, lichen-covered granite walls set the tone for her island garden. "Wall building is an art as well as an engineering feat, but most of all, it is a creative undertaking," says Mrs. Hill. "The walls are like lace, with open spaces between the solid frame, and are more fragile than their bulk suggests." To read more about Barnard's Inn Farm, turn to page 22. Photograph by Hollen Johnson.

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A Home for American Horticulture

We do a lot of talking in Society publications about our headquarters, River Farm, which we were fortunate to acquire 11 years ago through a grant from the Enid A. Haupt Charitable Trust. The current 25-acre property sits on the Potomac River's banks midway between the city of Alexandria, Virginia and George Washington's Mount Vernon estate. Many of our members have never visited River Farm, nor have they read a comprehensive history of the property. Since it boasts quite a background, and since our members' support has been crucial in our maintenance of River Farm, I would like to give you an abbreviated version of "the River Farm story," made possible by the research of Mary Benington, a River Farm docent, and Jeanne Eggeman, the Society's receptionist and book service coordinator.

In 1653, River Farm and its environs were acquired by Captain Giles Brent, the first English owner of the property. His wife Mary was the daughter of the Indian Emperor of the Piscataway tribe—hence the first known name of the property, Piscataway Neck. A subsequent marriage between the Brent and the Clifton families changed the ownership of the property and its name to, not surprisingly, Clifton's Neck. William Clifton built a brick house on the property in 1757, part of which remains in use today as the parlor of the main River Farm house.

Apparently, the new house caught the eye of one of Clifton's neighbors. George Washington, who already owned much acreage in northern Virginia, referred to his purchase of Clifton's property more than 20 times in his diary; he bought the original 1,800 acres in 1760 for 1,200 pounds (roughly \$2,885 in today's currency). Washington, an avid and skilled husbandman, spent many hours each day riding over his properties, planting, designing and supervising. He planted rye,

wheat and corn on his new property, which he named River Farm. Washington's personal secretary, Tobias Lear, lived at River Farm, and was given a lifetime lease on the property as a wedding present when he married Fanny Bassett, Washington's niece. Lear served the first president closely and was at Washington's bedside when he died.

After Lear's death in 1816, two generations of Washington's family lived at River Farm, then commonly referred to as Walnut Tree Farm. (Several very old walnut trees still grace the property. Although their age has not been officially determined, we like to speculate that Washington planted these trees himself.) In 1859, Charles Augustine Washington sold 52 acres of the property to a Quaker family from New Jersey—Isaac, Stacy and William Snowden. The Snowden family lived in this area for 100 years; Snowden Road, Snowden Station of the now-defunct Electric Trolley Line, and Snowden School bore witness to the family's influence and energy. The Snowdens gave River Farm yet another name—Wellington. It was known as Wellington by the next two owners—David Frost and, later, the Thompson family, proprietors of the area's largest dairy for many years.

In 1919, Malcolm Matheson, Sr. bought the property. The *Washington Star* reported before Mr. Matheson's purchase that this historic property was in lamentable condition, the house "broken" and the grounds sadly neglected. The Matheson family changed that, improving and enlarging the house and enhancing the grounds over the course of years.

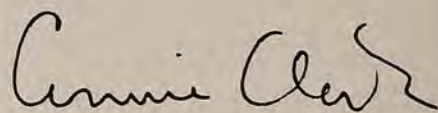
In 1973, the American Horticultural Society purchased River Farm from the Matheson family with funds provided by the Enid A. Haupt Charitable Trust. For 51 years, the Society had been headquartered in Washington, D.C. or Alexandria, Virginia, either in the homes of its early

officers or, in later years, in standard office-building accommodations. Imagine the delight of staff members at the news of this move! The Society's entire membership embraced the opportunity to make this magnificent property "a home for American horticulture."

Today, River Farm boasts a number of display and test gardens co-sponsored by the American Horticultural Society and various plant societies. Our Ideas Garden shows visitors what's new in ornamental and vegetable gardening. We also have a Dwarf Fruit Tree Orchard, a water garden, the beginnings of a woodland walk and one of the largest osage orange trees in the United States (as determined by the U.S. Forestry Service's Big Tree Program).

But of all the plantings at River Farm, I find the wildflower meadow most moving, perhaps because I can imagine this beautiful property graced with similar stands of daisies, evening primroses and black-eyed Susans before any settler found it. The eye follows the line of the massed flowers down the gentle slope to the riverbank. Swallows dart over the meadow; the huge old trees lift another year's leaves to the sky.

This scene always reminds me of how fortunate we are to be here. As custodians of this unique and historical place, we members of the American Horticultural Society protect centuries of tradition as we hope to create our own special history—the beautiful story of American horticulture.

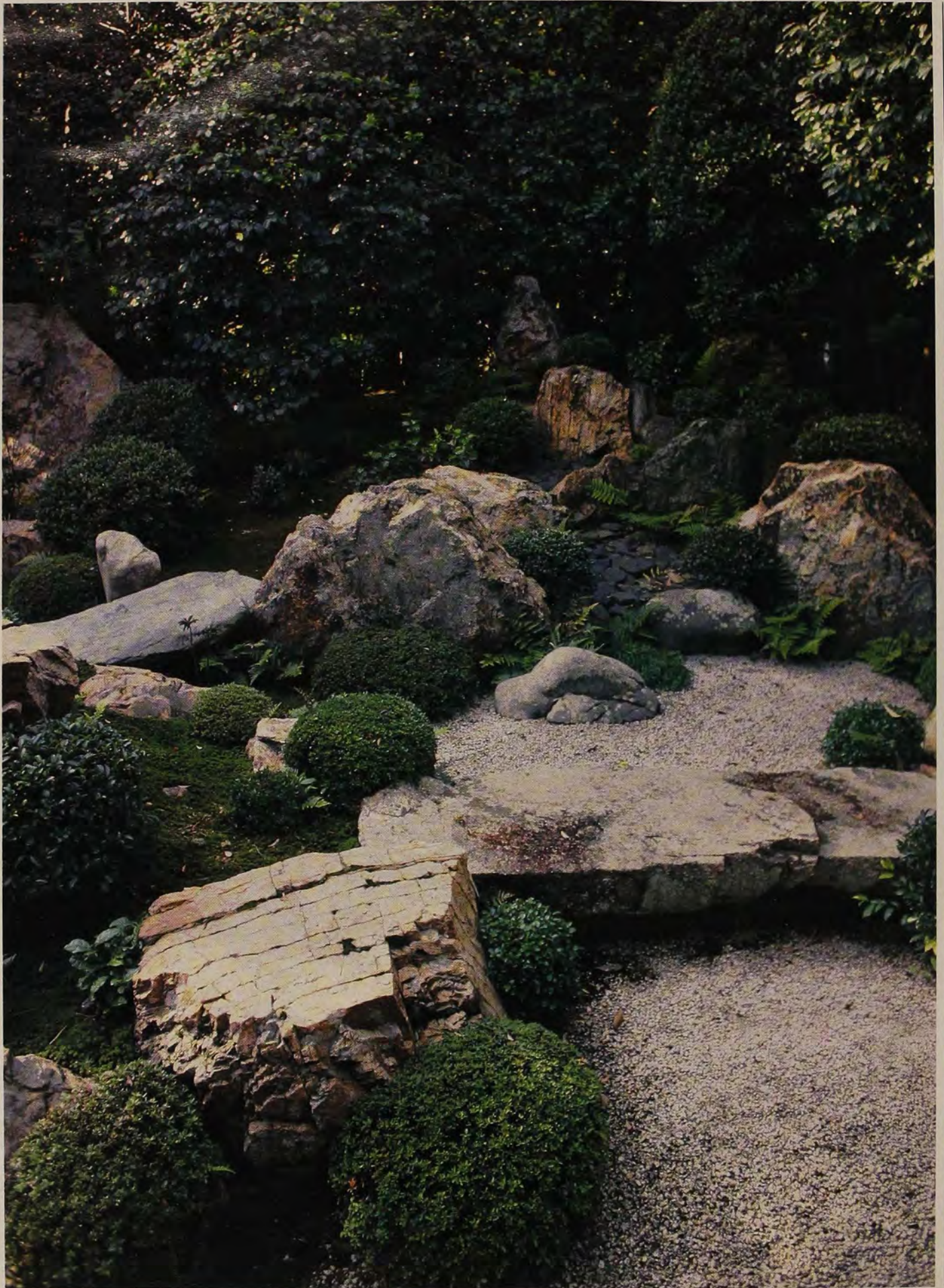


—Connie Clark
Membership Director



CLOCKWISE FROM TOP: In May, oxeye daisies fill the meadow, which runs from the ha-ha wall below the main house down to the banks of the Potomac River. The main house sits in the shade of an enormous tulip tree, *Liriodendron tulipifera*. A brick arcade separates the ballroom yard from the ballroom yard. An ancient black walnut, *Juglans nigra*, overlooks the river.

Photographs by Tim Weber



Margaret Hensel

Dry Streams



Pamela Harper

Gardeners with a running stream or spring-fed pond on their property can create water-oriented plantings that waterless gardeners often despair of ever possessing. Gardeners without a natural water source can remedy this shortcoming by constructing an artificial pond, perhaps with a circulating pump to bring water to a newly fabricated waterfall or stream. However, such gardeners must rely on wells or public water authorities

to keep their ponds topped up and their streams flowing. For all but the smaller water gardens, using a supplemental water source to keep the stream running and the pond filled can be expensive. During times of drought, when the use of water for recreational purposes is restricted in many areas, a hot summer may find many gardeners with a dry pond.

Fortunately, many of the aesthetic charms of water in the garden do not depend exclusively on the actual presence of the water itself. The sense of movement associated with running water and the cool tranquility that emanates from still water can often be conveyed by carefully manipu-

lating the terrain of a planting site—that is, by incorporating well-designed arrangements of stone, sand and gravel, and by thoughtfully selecting the plants to be used.

The idea of using sand or gravel to represent a stream, pond or lake originated in the Orient, where it has been nurtured for centuries. Such “bodies of water” can be either literal duplications of dried-up streams or elaborate stone and sand compositions representing the passage of water from the mountaintops down through valley gorges and finally into the sea.

Before setting out to create your dry stream, decide what function it will play

LEFT: An Oriental-style dry stream in the Japanese garden of Taizo-in. ABOVE: A dry stream need not be constructed of rocks and sand; this one in California is made of succulents and sedum.

GARDEN DESIGN

and how it will fit into your garden layout. Carefully consider the scale with which you will be working. If you want to simulate a stream passing through your garden that will complement existing trees and shrubs, direct your efforts toward mimicking the dimensions and characteristics you would find along the banks of a natural stream. If established plants play no significant role in determining the scale of your undertaking, you may want to try your hand at creating an abstract, Oriental-style composition of stone and sand that brings mountains and oceans into your garden.

The Natural Look

If you want to simulate a stream on a life-like scale, set aside thoughts of abstract representation, and concentrate on how you can bring the illusion of the presence of water into your garden. Your dry stream can be a literal recreation of a streambed, giving the impression that water, although currently absent, may return at any time. Or, for a more ambitious approach, you can suggest the actual presence of water by injecting a sense of movement and flow into your creation.

Regardless of the route you select, the final product must harmonize with its surroundings both in scale and appearance. Since you will be working to recreate in your garden what exists naturally elsewhere, you will need to take into account the lay of the land through which the "stream" will pass. It will help a great deal if you study the characteristics of streambeds that pass through similar terrain in your area.

When laying out your dry stream, follow the path water would naturally be inclined to take. Never permit the appearance of water running uphill or against the prevailing grade. If you choose to alter the site to fit specific design objectives, be sure your streambed conforms to the alterations.

Use materials that are consistent with the naturally occurring streams you want your stream to resemble. If you base your recreation on streams in your own area, the proper materials will be readily available. While you gather stones, devote some time to studying how they were shaped by passing water and how different types of stones take on distinctive characteristics as water rushes over them. Are the streams in your area flowing over sandy, gravelly or cobbled bottoms? Igneous rocks in or



Michael B. Trimble

The small dry stream in the author's wildflower garden. This photograph was taken in early spring.

near a streambed are usually worn smooth, but the edges of the sedimentary rock that often protrude just beyond the water's reach are angled. Keep in mind that the stones outlining your dry stream should blend convincingly with the materials along the bottom.

The type of garden you envision will help you determine if your dry stream will create the illusion of a placid, meandering watercourse or will resemble the bed of a more active stream that passes over rocky steps in a series of short cascades. In either instance, although the water is absent, its level of activity should be suggested by the traits of the streambed. These traits can be used to reinforce the prevailing character of the surrounding garden. For example, an alpine garden would benefit from rocky, short cascades suggesting a mountain stream, while islands of flowering shrubs might be enhanced by peaceful, sweeping curves suggestive of a meandering, lazy brook.

Once the stream's path has been chosen, its character determined and suitable stones selected, the real challenge begins. How are you going to arrange the stones so that they appear to have been laid randomly by natural forces? Although there are a

number of guidelines that gardeners might follow (some of which are mentioned later), successful recreation of a natural stream is more a matter of keen observation than of adherence to rules.

A creative use of the dry stream idea is to instill a feeling of the water's presence by focusing on its movement. An excellent example of this ambitious style is the dry cascade of the temple garden of Saiho-ji in Japan. The scale is that of a life-sized mountain cascade, and the stones have been chosen and arranged to leave no doubt in one's mind that if water were present, this is the path it would naturally take.

To create this kind of effect in your own garden, the stationary stonework of the dry stream must convey the characteristics of running water. Begin by considering how water actually moves. When it flows downward, its movement can be hastened by a series of falls or a narrowing in its path. Its course can change as the terrain through which it passes takes on different characteristics. The manipulation of these topographical features is important in creating a sense of movement in your dry stream.

This project, like the simple recreation of a natural streambed, is constrained by

the natural surroundings. Its character, too, will be influenced by the type of garden you plan to create around it.

Fortunately, many of the aesthetic charms of water in the garden do not depend exclusively on the actual presence of the water itself.

Once again, begin by charting the basic course the stream will take. Follow the lay of the land, from the high ground where the stream originates to the point where it disappears. To emphasize the feeling of movement, you can alter the stream's course, excavate changes in the depth of the "water," or incorporate small side pools whose placid nature can contrast with the "movement" of the main current.

Take care in selecting the stones that will outline the stream. Although it is unnecessary for the type and size of the stones you use to be uniform, they should appear to be related by the forces of the "water" that they bound.

Individual stones or groups of stones can be used to signal a change in the stream's direction or the water's level of activity. As you arrange your stones, you may want to follow a few basic guidelines to help enhance the aesthetic appeal of your project. Larger stones should be balanced by clusters of smaller ones. Stones that seem to thrust upward can be played off of horizontal arrangements, thereby heightening the sense of flow as your gaze passes from one group of stones to the next. Try to avoid juxtaposing distinctive stones unless you are introducing a change in the stream's character. Once the arrangement is complete, its individual elements should catch your attention without arresting it; ideally, your eye should pass easily along, following the stream's flow.

Use cascades of piled-up stones to take the stream from one level to another. The stones of the cascades should be similar in composition to those used in the stream itself, or at least visually compatible. An abrupt change in texture, color or shape can dramatize the change from stream to cascade, but diverse materials should be integrated without interrupting the overall flow. Cascades can be composed of a single

fall or a series of steps. If you select the latter, be sure that the steps are irregularly spaced, even haphazard in appearance.

When you plan the course your stream will follow and how its stones will be arranged, you will find that the illusion of movement and flow will be most effective if you keep one or more primary viewing positions in mind. The relationship of the stones to one another will govern the direction the stream takes as well as the rate at which it is "flowing." So, to achieve a sense of flow, it is important to consider how the placement of the stones can most effectively work on the imagination. For example, grouping the larger stones in the background, fairly close together where the stream originates, will give the viewer standing in the foreground the impression that the stream is running toward him. As the stream progresses forward, the spacing between stones and stone groupings should increase gradually, while the average size of the stones will slowly decrease. To coax the eye to follow your stream, follow the downward path suggested by the terrain, place turning stones where a natural change of course might occur, and carefully manipulate the spacing between individual stones and stone groupings.

The successful creation of a "flowing" dry stream is based, in large part, on the type of material used to cover the stream's bottom. As mentioned earlier, the stream bottom of a simple literal recreation should reflect the impact that moving water would have on the stones. Here, however, you want the bottom to reflect the movement of the water itself. To create a compelling impression of substance in motion, you can easily fill coarse sand or gravel in among the stones, arranging it so that it snakes through the various rapids and gathers up at the edges of the falls. Unfortunately, keeping weeds, litter and leaves out of a sandy bottom can become an irritating maintenance problem. If you use black plastic to suppress weeds, you will need to take special care to prevent the sand from being washed off the slippery surface. Rounded cobbles are more difficult to work in among the crowded stones used to outline the stream. However, they can easily create the impression of moving water regardless of the viewer's vantage point. An undulating stream of cobbles, lightly moistened just before visitors arrive, will complement most dry stream arrangements.

Mosses pressed into the bare soil make an excellent substitute for sand or gravel. Ribbons of green running around the stones

that channel the stream can be highlighted with reindeer lichen to suggest the churning effect of swirling rapids or eddies. This combination works best in shady spots where ample moisture is readily available. (For more information on how to start and grow these plants, see "Moss and Lichen Gardens" in the February 1983 issue of *American Horticulturist*.)

Even if your stream site has an appropriate passage from high to low ground, excavating the site before the first stones are brought in will enable you to create the undulating bottom and occasional side pools and falls that add to the overall impression of moving water. The stream's bottom should be deeper in the middle than along the banks. When the larger bank and turning stones are set into place, be sure to dig them securely into the ground; they should look as if they are firmly anchored in place. Resist the temptation to use concrete or cement in securing your stones; unless carefully concealed, the appearance of either material will add a harsh, static element to your "moving" creation.

Plantings for this type of dry stream should be compatible with the size of your project, but you need not restrict yourself to those plants likely to be found naturally along a stream. Base your plant selections on the available growing conditions and your personal preferences. Shady spots could host stream-side plantings of maidenhair ferns, primroses and *Epimedium*. Sunny sites could be planted with Siberian iris and cinnamon ferns. If you have matched the type of stream to the surrounding garden, you should have no difficulty finding attractive plants to add to the banks of your new bodies of "water."

Zen & the Dry Stream

To many people, the simple, austere stone and sand arrangements found in Oriental gardens do not constitute true gardening; to others, this style represents one of the highest refinements of garden artistry.

The gardens associated with the Zen temples in Japan are undoubtedly the best examples of how stone and sand can be used to create illusionary vistas of mountains, streams, rivers, oceans and islands. In the hands of the Zen masters, gardens were created to aid meditation and self-discovery, offering as few sensory distractions as possible while encouraging thoughtful contemplation. On an abstract level, these gardens can be viewed as ex-

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amples of austere representational landscape art; on a simpler level, they demonstrate how stone and sand textures and forms can be juxtaposed to create beauty in the garden. They draw heavily on the viewer's imagination and thought; many resist any attempts to classify them definitively. The garden at Ryoan-ji, the Dragon Peace Temple, is the finest example of how stone and sand can create a compelling garden without being a representation of anything in particular. In contrast, the Zen garden at Daisen-in is unmistakably representational. Yet both demonstrate the Zen ideal of reducing the complex to the simple, drawing out the ultimate relationship and interdependence of all things.

In order to be effective, such gardens must be isolated from their immediate surroundings; the presence of large trees, shrubs or other visual distractions will quickly diminish the impact of your peaks and seas. Both the famous Japanese gardens at Daisen-in and the Zen masterpiece at Ryoan-ji depend on enclosing walls to isolate them from unwanted scenery.

The scale of these gardens can vary from large to intimate, depending on the space available and the discretion of the garden-maker. The east garden of Daisen-in convincingly portrays what exists naturally over many square miles in only a 12-by-47-foot area. There is nothing literal about this depiction, but the elements of stone and sand are so carefully combined that a cluster of stones—brimming with sand and giving way to smaller stones that are abutted or surrounded by more sand—gives the unmistakable impression of a mountain and cascade feeding a river, flowing in a valley, that eventually spreads out into a more expansive lake or sea. The garden's creator relies on the viewer's willingness to find mountains, falls and rivers among all the materials that have been so meticulously arranged in the temple courtyard.

The stark simplicity of Daisen-in points up the difficulty in developing a highly stylized, representational dry landscape. There are so few pieces to work with that each piece must be handled properly. The stones must appear to belong together; the eye must be compelled to move easily from stone to stone. Their arrangement must provide a point of origin and then draw the eye along to the stream's conclusion. This can be achieved by using stones with a progressively softer outline toward the foreground. The more dynamic, expressive stones belong in the cascade or at the stream's origin. The progression from the

surging motion of a mountain stream to the more languid character of a broad river is expressed by the changing characteristics of the stones, as well as by their arrangement and spacing. Vertical planes are more dynamic than horizontal planes; jagged outlines suggest a level of activity missing in the softer, more rounded shapes.

Once again, the actual arrangement of the stones should be planned with a primary vantage point in mind. A cluster of stones in the background, leading to more widely spaced stones in the foreground, will direct the stream from back to front. Reversing this spatial arrangement, if carefully done, will give the impression of the stream originating at your feet and flowing outward into a distant sea. The key to successfully manipulating your materials is to play with the illusions created by different arrangements.

Depending on your taste, you may want to include plants in this type of garden. If plants are included, they must conform to the scale of the stonework and the scene depicted. The presence of flowers on either woody or herbaceous materials will undermine the impression of mountains and vast seas; mosses and lichens will not. Rigorously clipped azaleas, yew or boxwood are often used to suggest wooded hillsides. Part of the challenge of creating mountains and seas in the space of a back yard lies in how you handle the plants.

There is a temptation to conclude that dry streams are only suited to walled gardens where the scale of reality is banished. Yet there is no reason why the natural styles described earlier and exemplified by the dry cascade at Saiho-ji cannot be used effectively to augment the beauty of gardens whose scale and character are dominated by trees, shrubs and flowers. You can compensate for the absence of water by selectively choosing and arranging the materials to be used in the dry stream or cascade. It is a challenge for both the garden-maker and viewer to bring the character of water into a bed of stone. In the theater, it is the willing suspension of disbelief that allows the audience to accept the stage set as real. Given the same willingness on the part of the garden visitor, a well-made dry stream can be equally convincing. ☐

—Michael B. Trimble

Michael B. Trimble is a landscape gardener and plant collector. He is the author of "Reading Tree Leaves: A Guide to Diagnosing Symptoms," which appeared in our June 1983 issue.

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Book Reviews

HOME GROUND.

Allen Lacy. Farrar Straus & Giroux.
New York, New York. 1984. 270 pages;
hardcover, \$14.95. AHS discount price,
\$13.45 including postage and handling.

Most gardeners don't look to the *Wall Street Journal* for horticultural inspiration unless they are regular readers of that publication. Allen Lacy's periodic column on gardening is not to be missed; what he has to say strikes directly to the heart of every gardener's successes and failures. *Home Ground* is a series of essays, many of which first appeared in the *Wall Street Journal*, on a myriad of gardening subjects. The topics range from Lacy's family origins on a leafless Texas plain, to such familiar subjects as the first spring bulbs, the frustrations of mail-order purchasing, or that ultimate nongardening activity—mowing the lawn. For pleasant entertainment on a subject that is dear to all of our hearts, I highly recommend this book. You will enjoy it, whether you read it from cover to cover in one sitting or just sample an essay or two before bed each evening.

THE DAMP GARDEN.

Beth Chatto. J. M. Dent & Sons, Ltd.
London, England. 1982. 336 pages;
hardcover, \$19.95. AHS discount price,
\$17.45 including postage and handling.

This is a story of the development of a garden. Although damp soil often discourages garden-makers, in this case, the author has turned these specialized growing conditions into an advantage. This is not the story of a water garden, although the author's garden does have areas of open water; the garden and the plants discussed in this book are growing in the damp areas along the edges of this open water. The gardening techniques and the plants discussed are also applicable to wet or soggy areas in which a pond or stream is not present. While this is an English book, and the usual warnings regarding plant selection for use in the United States are applicable, there is still much to recommend this book to American gardeners. The first half of the book describes the building of the garden over a period of many years, while the second half is devoted to a de-



Allen Lacy, author of *Home Ground*.

Michael Lacy

scription of the plants that might be used in such a garden.

THE VICTORIANS AND THEIR FLOWERS.

Nicolette Scourse. Timber Press.
Portland, Oregon. 1983. 195 pages;
hardcover, \$22.95. AHS discount price,
\$21.00 including postage and handling.

Plants and flowers permeated the fashionable life of the eighteenth century. The passion for natural history extended from the very rich, with their great gardens and conservatories, to the very poor, such as mill workers who bred new varieties of pinks and used them as inspirations for the patterns they wove. The influx of new species from many unexplored portions of the world helped spark the interest in botany; plant enthusiasts from all walks of life competed to collect and grow the largest

collections they could. Nicolette Scourse has provided us with an authoritative and readable history of the impact plants had in the daily life of the Victorians.

CEROPEGIA, BRACHYSTELMA AND RIOCREUXIA IN SOUTHERN AFRICA.

R. Allen Dyer. A. A. Balkema
Publishers. Rotterdam, Netherlands.
1983. 242 pages; hardcover, \$35.00.
AHS discount price, \$37.00 including
postage and handling.

This is a botanical monograph primarily of interest to botanists. The subject material, however, covers a number of genera that are popular among specialized plant collectors; at least one species, *Ceropegia woodii*, is a very popular house plant. The work is well illustrated with line drawings, watercolors and photographs, and distri-

bution maps are also included for each species. If you are interested in any of the more exotic species in these genera, or in succulent plants generally, you may want to add this excellent reference book to your collection.

ALPINE AND ROCK PLANTS.

Will Ingwersen. J. M. Dent & Sons, Ltd. London, England. 1983. 212 pages; hardcover, \$22.50. AHS discount price, \$19.50 including postage and handling.

Gardening enthusiasts know Will Ingwersen as an English master of rock and alpine gardens. In this book, Ingwersen's latest, he discusses his successes, his failures and his favorite plants for the rock garden. This is not an encyclopedic listing of plants but a more personal commentary, meant to be read at leisure. Cultural idiosyncrasies are described where appropriate, and an excellent index makes individual plant references readily available for the more impatient reader who can't spare the time to just sit back and enjoy this book.

WILDFLOWERS ON THE WINDOWSILL.

Susan Tyler Hitchcock. Crown Publishers, Inc. New York, New York. 1984. 143 pages; hardcover, \$12.95. AHS discount price, \$11.85 including postage and handling.

This book, judged by its title alone, seemingly encourages a destructive activity—collecting and then growing wildflowers under conditions that might bring only limited success. Readers who suppress their initial inclination to steer away from the book, however, will find that the author is well aware of this potential response. She deals with it in the first chapter of the book in a section entitled "Where and What Not to Gather," and then goes on to describe the beauties of such common weeds as plantain and dandelion when grown in a window box indoors. Far from encouraging the destruction of wildflowers in their habitats, the author opens up a whole new aspect of garden enjoyment. This is definitely a new approach to growing and enjoying plants that might otherwise be considered weeds, and whose beauty would thus be overlooked. ☼

—Gilbert S. Daniels

Gilbert S. Daniels is the Immediate Past President of the American Horticultural Society.

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The Disa Orchid

TEXT & ILLUSTRATION BY PETER LOEWER

Late in 1981 while reading *The Avant Gardener*, the newsletter for “garden-minded people,” I spied an article cryptically entitled “Disa Data.” According to the article, “There’s wide agreement among orchidists that disas are the most beautiful of all terrestrial orchids. . . . Until recently, there was also general agreement that these South African orchids were very difficult to grow.” The article said that much of this misconception was due to attempts to grow disas in greenhouses devoted to tropical epiphytes. It went on to say that Dr. Warren Stoutamire of the University of Akron in Ohio had discovered the secret to their successful cultivation. The doctor found that these particular orchids inhabit cool, constantly moist areas, preferring winter night temperatures of 32° to 45° F and summer day temperatures no higher than 70° F. They therefore make perfect companions for other denizens of a cool greenhouse, including cymbidiums, clivias and freesias.

My interest was piqued, especially since I had lost most of my orchid collection during the winter of 1977. Layers of ice on power lines had left us without electricity for four days, and, when the heat finally came back, pots of dead orchids surrounded a few healthy cymbidiums in the frigid greenhouse. With only one small wood stove and one kerosene heater, the orchids lost out to the human inhabitants.

I wrote to Dr. Stoutamire, who told me that he, too, had lost many tropicals that year—including some of his best disa clones—but that these terrestrial jewels do stand a better chance of survival in the cold. Eager to try something new, I ordered a four-inch pot of *Disa uniflora*, and the plant duly arrived by UPS late in March. Buds soon formed, and, late in July, they opened to reveal three beautiful flowers in varying shades of orange and red, with the uppermost sepal lined in delicate traceries of a deeper color.

As I was now a disa convert, I made an attempt to ferret out the derivation of the Latin name. I looked in the *Royal Horticultural Society Dictionary of Gardening*, but it only gave “(derivation?)” after the name, a most unusual notation for that august tome. *Hortus Third* was no better, and, unfortunately, I had given away most of my books on orchids after the demise of my collection. Then I remembered the often-interesting comments in the catalogue of Chiltern Seeds, an English firm that carries a prodigious selection of orchids, including many species from Africa and Australia. Not only did they stock *Disa* seed, they also had information about the name: “Named, in what must be one of the most abstruse of plant name derivations, after one, mythical, Queen Disa of Sweden who, commanded

to appear before the Swedish king neither naked nor clothed, duly attended wrapped in a fishing net. . . . Still it does conjure up a not unpleasant picture!” (Petrus Jonas Bergius, who named the plant, was a Swede, and the upper lip of the flower has a netted appearance, not unlike a fishing net.)

The catalogue also noted that disas are commonly known as the Pride of Table Mountain in their native Africa and have captured the imagination of plant lovers the world over. And, although the seeds are minute, disa is one of very few orchids that will germinate without extra-special treatment.

Disa plants are found growing along streams, sometimes in the company of grasses. According to the American Orchid Society, they are now carefully protected in their native habitat lest they be exterminated.

In his instructions on care, Dr. Stoutamire noted that these orchids will grow well in low-nutrient, well-drained soil mixes of peat, perlite and vermiculite. He uses equal portions of each, and fertilizes during active growth at intervals of one to three weeks using an acid, 30-30-30 fertilizer in low concentration. He recommends rainwater, but I’ve used our well water with equal success. Stoutamire also found that these plants resent lime and, after a few experiments, found that roots were severely damaged after six months of application.

Disas are never completely dormant, and grow slowly throughout the year. Before and after flowering—usually during June and July—new offsets are produced at the crown of the plant; these will flower the following year. Once a mature plant does flower, it dies off. If buds appear on a plant that has not produced offsets, they should be removed. Otherwise, you will enjoy the coming flowers but sacrifice future plants.

Soil mixes must be moist, not waterlogged, and plants should be divided or repotted only after old flowering growth dies. When given proper, and cool, growing conditions, disas enjoy as much light as can be provided. They will also thrive under florescent lamps. According to Dr. Stoutamire, disas seem to enjoy the company of other plants, and I have followed his advice by placing them close to neighboring pots.

The fresh green leaves of a healthy disa look more like those of an iris or daylily than an orchid, and remain a welcome sight in a plant collection when most other orchids are dull and lifeless. They are a constant reminder of the beautiful flowers that will appear year after year. ☉

Peter Loewer is a botanical artist and scientific illustrator who writes and illustrates his own books. He is the author of *Peter Loewer’s Month-By-Month Garden Almanac*.

A Garden Tour

BY RUBY WEINBERG

We had not been in New Zealand very long before we were asked the question: "Well, mate, how do you like our country?" Almost every Kiwi we met on our five-week garden tour wanted our opinion of his homeland. Kiwi is the affectionate name New Zealanders have given themselves; as we soon discovered, whimsical humor is a part of their culture, for the New Zealand Kiwi is a chicken-like, flightless, nocturnal bird that lays a ridiculously large egg.

It was almost the end of October when my husband and I arrived for a first look at the country. Our port of entry was Auckland on a narrow strip of New Zealand's North Island. Green, rugged and brilliant in bloom—that was our overall impression of this land "down under." The Kiwi question was easy to answer, and we did so in their vernacular: "En Zed is bloody marvelous!"

For those of us who live in the Northern Hemisphere, it is exciting to witness spring unfolding when, at home, the autumn leaves are beginning to turn. Although there is momentary confusion caused by this seasonal disparity, the language poses few problems for the American tourist. In-depth communication is possible, and my husband and I found the Kiwis to be friendly, loquacious and informative. Best of all, gardening seems to be a favorite topic, and discussing plants with our hosts—not to mention reading their horticultural literature—is an enriching experience.

Most Kiwis are of British descent. Perhaps the Englishman's love of gardening is an inherited trait, for next to rugby, it is probably the most popular hobby in New Zealand. We met very few city or country dwellers who were not involved in some way with the growing of plants. On one occasion, we stumbled upon a typical village scene: a large number of people busily engaged in a fuchsia festival. National plant societies, specializing in everything from rhododendrons and orchids to camellias and house plants, attract many members.

Amid such horticultural diversity, I tried to concentrate on the garden elements that

I most admire: water, wall and rock plantings. It was exceedingly difficult with so much to distract me. I looked for plants surrounded by and reflected in water; I scanned every wall overhung with ornamentals; I tried to identify creeping, crawling and cascading plants, especially those in rock garden settings. All were there in great profusion. I also tried to learn about the country itself.

These Southern Hemisphere islands are 10,000 miles from New York City and 6,000 miles from Los Angeles, all alone in the South Pacific. The country should not be confused with Australia, which is over 1,200 miles from New Zealand's shores. New Zealand is similar to California in size and shape, although the country is divided into two major islands. Unlike California, however, New Zealand has a population of only a little over three million. Because of its small population, the country is—even in this day and age—a paradise of pristine scenery, pure waters and unpolluted atmosphere.

The two main islands of New Zealand are, for the most part, well supplied with water. Springs, brooks and rivers spill forth from the steep mountains, and lakes abound. Abundant rainfall helps to maintain a green mantle of grass all year round. Fifty percent of the land has been classified as steep, 20 percent as hilly, and 30 percent as rolling or flat. In such an undulating landscape, terraced gardens flourish everywhere.

From Auckland north, the climate is subtropical. Palms and banana trees remind me of South Florida. But what a difference! Intermingled with the familiar is evergreen *Cordyline australis*, the native "cabbage tree," as well as the yucca-like *Phormium tenax*, commonly called New Zealand flax. Tough fibers in the sword-shaped leaves were used by the Maoris, New Zealand's earliest settlers, for clothing and cordage. These two species are everywhere.

As we traveled, I began to have a feel for New Zealand-style gardening. Home landscapes are, for the most part, small.

As in the United States, artistic design is usually secondary to the growing of plants. However, horticulturally speaking, the Kiwis are fortunate to have such a moderate climate. Except for mountainous areas, the mean temperature on North Island varies, winter and summer, from 46° to 73° F. South Island is a little cooler—31° to 70° F. Though greater extremes do occur, moderation permits unlikely plant associations, and New Zealand's dedicated gardeners are able to grow an enormous variety of plants.

Driving south from Auckland, I noticed that each little town and hamlet sported flamboyant rockery plantings. We saw them in the center of tiny plazas, in planter boxes, and often, interspersed with rocks in front of fenced-in private dwellings. In many places, stone walls were planted with trailing herbaceous plants. (The Kiwis sometimes call cascading plants "spillovers.") Some of these rockeries included dwarf, flowering New Zealand and Australian natives: *Hebe*, *Olearia*, *Parahebe*, to mention only a few. I was especially impressed with dwarf forms of *Leptospermum scoparium*, commonly called New Zealand tea tree, or manuka. Thousands of hilly acres were covered with wild, white manukas. Because they are so pretty and long-blooming, New Zealand hybridizers have created many attractive cultivars in various colors.

Endemic plants add distinction to New Zealand gardens. However, the country's native flora has not always been used to advantage. New Zealand's colonists were hell-bent on importing everything from their distant motherland, and it took the passing of years for Kiwis to begin to appreciate the native flora, 75 percent of which is found nowhere else naturally on the globe. Today, there seems to be intense interest in New Zealand's native plants. Botanical preserves are located in Christchurch, New Plymouth, Chateau Tongariro, Wellington and Auckland. We stopped briefly at the South Auckland Botanical Garden, Manurewa, where cultivation of New Zealand's native plants is the prime objective.



Photographs by National Publicity Studios, New Zealand

Here, also, are demonstration plots showing homeowners how to use native plants in their own gardens.

Those New Zealanders who are keen on nomenclature must learn botanical, common and Maori names for their indigenous plants. The Maoris, descendants of Polynesians who preceded the Europeans on these islands, have remained a vital part of the New Zealand culture. Maori names for towns, rivers and mountains, as well as for shrubs and trees, add a piquant flavor to the New Zealand experience.

Southeast of Auckland is Rotorua, a small city located on a volcanic fault. Here we had our first look at the New Zealand bush (forest) and water plantings. Rainbow Springs and Paradise Valley are two tourist resorts located among innumerable springs and watercourses in the area. Huge trout thrive in meandering streams and small pools, which are surrounded by native ferns and mosses. The area is a showcase for exhibiting some of the 150 species of ferns found throughout the country, from the three-quarter-inch, filmy fern to giant, 50-foot-tall tree ferns. In another garden, a grove of tree ferns growing at the edge of a stream caught my attention; they were *Sphaeropteris medullaris* (formerly *Cyathea medullaris*), black ponga. Each plant was about 15 feet tall with a slim, black trunk and graceful, weeping fronds. In New Zealand, tree ferns are commonly lumped together and called pongas, and the trunks are widely used in building garden fences, walls and arbors.

In Rotorua we also visited a private garden, where Don Young, his wife and two sons were busily engaged in a whole host of horticultural activities. Their 1½-acre garden was enchanting on the day of our visit. Most memorable was their pond, actually a series of small and large pools

ABOVE: September brings early-spring masses of daffodils to Hagley Park in Christchurch, New Zealand.

BELOW: Rhododendrons offer a breathtaking spring display at Pukeiti, a private preserve with a comprehensive collection of rhododendrons of the world.

surrounding a bluestone patio. Volcanic rock, abundant in this area, was used to make the pools. The backdrop of ornamental trees, especially live oaks, created a woodland effect. Around the pool were many dwarf pines and junipers, and a low Japanese maple. A distinctly Kiwi touch in this otherwise Japanese design was the profusion of flowering plants. *Cyclamen persicum*, the common florist's cyclamen (possibly hardy here), and water-loving orchids were placed in rock crevices. There were also primroses tucked into little islands, and drifts of violets floated along the edges.

Gardens throughout New Zealand were resplendent with blooming azaleas and rhododendrons during our visit. Although rhododendrons are not indigenous to these islands, the moderate climate is perfect for their cultivation, and we saw an enormous number of species and hybrids throughout the country. Many rhododendrons were in their prime during our trip to Pukeiti (Little Mount), a private rhododendron preserve on 900 acres just outside New Plymouth. Pukeiti has a comprehensive collection of rhododendrons of the world. I looked for dwarf selections, so useful in rock settings, but unfortunately, the smaller rhododendrons are not at their best at Pukeiti; excessive rainfall causes these plants to lose their compact stature. Many alpine seemed to thrive under these conditions, however. *Iberis*, *Gentiana verna*, *Lithospermum* and a flaming red phlox billowed from the high stone wall on the east side of The Lodge. These represented some of the alpine grown in fine rock gardens all over the world. However, in New Zealand I was beginning to expect the rare and unusual, and I found it at Pukeiti. In one damp place, a patch of white-flowered, golden-throated *Ourisia* grew; it is the native New Zealand mountain foxglove and looks somewhat like a small primrose. Behind a garden bench were a few plants of a hardy species of *Gladiolus*. Though small, their orange blooms were brilliant. Even North America was represented here; I came upon a few plants of the woodland fairy-lantern,



Ruby Weinberg

Disporum smithii, with ivory, funnel-shaped flowers. Primroses of many species abound at Pukeiti. I noticed that here not all of these seemed to require the partial shade necessary in my own New Jersey garden.

It was in these gardens that I saw *Rhodohypoxis baurii* for the first time. It is a charming creeper from South Africa, and reputedly lengthy in bloom. On my return home, I obtained some tiny bulbs for use as potted plants in my greenhouse. It will take time to evaluate their performance; their requirements are tricky—dry in winter and wet in summer.

As we left Pukeiti, driving south along the Tasman Sea, I could only marvel at what I had seen. New Zealand's skillful gardeners were able to draw upon a vast array of the world's ornamentals to beautify their landscapes, and they did this exceedingly well.

Eion Scarrow, host of the New Zealand television program "Dig This," laughingly attributes his success with plants to "nat-

The Christchurch Botanical Garden is located on 75 acres of Hagley Park. Here, a gardener works among the rock plants.

tering," or conversing with them. Then and there, I decided to carry on a little chitchat as I worked in my own garden if that was the way to achieve Kiwi results.

Although the Kiwi sense of humor is pervasive, New Zealanders appear to take their gardening seriously. Twice weekly Scarrow appears before a large television audience to present the latest in horticultural technology. His radio program is also popular, and his Garden Club boasts 1,700 members.

Unpretentious and unruffled, New Zealanders seem to avoid such things as "Keep off the Grass" signs. No one thinks it unusual to build a children's swimming pool in the very heart of one of the country's largest botanical gardens. Nor does anyone seem disturbed when wild ducks come to swim in that pool. In another botanical development where every tree is meticulously labeled, tennis courts and a bowling

green occupy a good deal of space.

Much to my delight, terraced plantings seemed to be the rule rather than the exception on both North and South Island. Occasionally, concrete blocks, slanted backwards and spliced with soil, were used for this purpose. In some places railroad ties held garden embankments; the Kiwis call them "railway sleepers."

In the small city of Palmerston North, home of Massey College, we viewed many beautifully constructed stone buildings and walls. The grounds throughout the campus were tastefully landscaped, and I saw azaleas, aubrietas and alyssums tumbling off some of the walls. It could easily have been a North American campus, except for the South African proteas used as specimens in several of the plantings. Just outside the college grounds, in Fitzherbert Park, we came upon a typical New Zealand scene: a pretty rock garden charmingly used to separate the park from the busy roadway.

To save time, we flew across Cook Strait to South Island, landing in its largest city, Christchurch. With the exception of the downtown area, the entire community boasts colorful gardens. One out of every eight acres is also devoted to park land. On 75 acres of Hagley Park is the Christchurch Botanical Garden. We strolled through the park, which is surrounded on three sides by the Avon River. On those sunny, breezy days toward the end of spring, every tree, shrub and flower appeared to be at its peak. Amid this luxuriance, I again became transfixed by a particular area: the rock garden. Situated in a southwestern corner of the park, a hillside-like planting had been created from the shingles (stone rubble) and loose soil dredged from the nearby river. Paths wander up, into and around the plantings, and are defined by rocks and large boulders. The garden is spread with mats of gray and silvery conifers, spring-flowering heaths (*Erica car-*

nea), small species tulips, and low azaleas in the background. *Hypericum*, *Saxifraga*, tiny iris and hundreds of other plants seem to flow in and around the rocks. Here, again, I found *Rhodohypoxis*. Noteworthy of the plants in bloom during our visit was a colony of a dwarf columbine from Japan, *Aquilegia flabellata* var. *pumila* (formerly *A. akitensis*). Only four inches tall, the plant bears blue and white flowers above its dainty foliage. In general, we were struck by the robust health and vigor of each and every plant within the garden's confines. To the North American visitor, it is a special thrill to see all of this in the month of November!

In the city of Christchurch, one place in particular has gained a horticultural reputation: the home and garden of Edgar Stead. Stead, who died in 1941, was a rhododendron hybridizer, and his deciduous Ilam (Knap Hill) azaleas have become world-famous. The property is now much reduced in size and belongs to the University of Canterbury, but some of the original plantings have been maintained.

The hillside, bordered by a stream, was aglow with blooming rhododendrons and camellias during our visit. A small bridge and water wheel framed the picture. In the shallows, I could not help but notice an interesting planting: a colony of the giant *Gunnera chilensis* (formerly *G. tinctoria*). The species is from Brazil and has huge leaves six feet across. In spite of their size, the plants did not look tropical and were, in fact, perfectly at home in this cooler climate. At a later date, I observed this same *Gunnera* in the river at Queenstown Governmental Gardens. Eventually, I discovered that there is a rare, tiny species—*Gunnera magellanica*—that would probably be more suitable than *G. chilensis* for edging small garden pools and streams. My interest in this genus grew. I learned that *Gunnera prorepens*, a small, bronze-leaved New Zealand native, also thrives in the damp soil adjacent to water gardens; it is particularly lovely in autumn, when it displays its multitudinous "candles" of bright red fruit. It is grown, or occurs naturally, at Pukeiti, but I missed it there.



A fascinating array of alpine plants can be found growing at Alouette Nursery in Ashburton on South Island. The collection includes both New Zealand natives and rock plants from around the world.

Ruby Weinberg

It was well into November when we left Christchurch. I felt like wingeing (grumbling) that our trip was more than half over, but on we drove to see alpine as they are grown at Alouette Nursery.

Jean and Jim LeComte, the proprietors of Alouette, specialize in treasured alpine, as well as choice dwarf conifers and rhododendrons. Oddly enough, this nursery, which features mostly mountain plants, is located in Ashburton, south of Christchurch on the Canterbury Plains, one of the few level areas in the entire country. Here on the Pacific coast, mountains prevent adequate precipitation from reaching the land, and drought sometimes occurs. Irrigation ditches, called water races, carry rain and melting snow off the hilltops and bring life-giving moisture to the agricultural plains.

The LeComtes greeted us warmly. True to the nursery's name, singing birds also welcomed our arrival. (Alouette is French for lark.) Here, on at least three of five acres, the LeComtes have created a fair-land in miniature. Far in the distance looms snowy Mt. Hutt, a well-known ski resort.

It dominates the entire view like a giant hovering over Lilliput. The plant shop, lath shade houses, demonstration gardens and house fill the LeComtes' property. All of this looks out onto seemingly endless beds of cushions, crawlers and cascaders that glow with vibrant color. Many have interesting foliage; most are diminutive in stature. Here, also, are dry wall beds, their crevices flowing with alpine jewelry. The rear beds are used by the LeComtes to raise propagating stock for their mail-order business. A woodland area contains a fine assortment of rhododendrons, including many dwarf species. The entire area is connected by a maze of lawns and pathways, enclosed by a ponga fence on which clambers the heavily blooming *Clematis montana* var. *rubens*, a vigorous pink-flowered vine from China.

As I looked out upon Lilliput, I realized that most of these alpine require perfectly drained soil. For some of the plants, scree must be assembled. Scree is composed of bits of mountain rubble mixed with decayed foliage. The Alouette growers must be experts in soil preparation, for they suc-

cessfully import, propagate and grow some of the world's rarest alpine. Quite a few are tiny members of genera that contain larger species—*Ranunculus*, *Iris* and *Potentilla*, for example. Many, such as *Cassiope*, *Pleione* and *Gentiana*, would be classified as "difficult" in the United States.

The LeComtes would like to encourage the use of New Zealand mountain flowers in gardens, for they are not yet widely cultivated. Many species of *Celmisia*, for example, do well in Kiwi gardens but are not yet popular among New Zealand's gardeners. The flowers are typical of daisy family members, with white rays and yellow discs. Possibly 60 species have evolved in New Zealand, some with silvery foliage.

Jim LeComte has made a special study of *Aciphylla*, which grows in odd, rosetted mounds. Forty-five different species of *Aciphylla* have been identified. One in particular had been misidentified until Jim found it on a mountainside and identified it as a distinct species. The plant was subsequently renamed *Aciphylla lecomtei*.

At a neighboring estate garden, Holmeslea, we enjoyed walking through the 7½ acres of beautifully maintained trees, shrubs, rhododendrons and perennials. I was intrigued by the small bi-level rock garden separating the drop in elevation on the side of a staircase. It contained a few dwarf conifers for vertical accent and was planted with more of those precious alpine.

On a trip with Jim LeComte to the slopes of Mt. Hutt, we had our first glimpse of *Raoulia*, commonly known as vegetable-sheep. (The name is suitable, for farmers often mistake the plants for flocks of grazing sheep when viewing them from a distance.) The succulent, curlicue foliage is thickly covered with white hairs and clings to everything in its path. Surprisingly, the leaves felt tough and leathery. I learned that *Raoulia* is difficult to grow in the garden, although a few New Zealand and English nurserymen have been successful with some species.

Dwarf conifers and azaleas dot the rock garden at the Christchurch Botanical Garden.



Ruby Weinberg



Ruby Weinberg

It was a bit early in the season to see many alpine flowers in the Southern Alps, the high mountains of South Island. Nevertheless, my husband and I were determined to hike in the area. The wonder and beauty of this country were first experienced by pioneers who threaded their way on foot through the formidable mountains, and we felt it was appropriate to follow in their footsteps.

In New Zealand a hike is called a "trek." Because so many Kiwis enjoy outdoor activities, comfortable hut (cabin) accommodations have been provided by the government even in the most remote areas. So-called "freedom walkers" venture alone, but we chose to hike with an organized tour called The Routeburn Trek. A little four-day walk does not adequately describe our experience. With a leader, two guides and a small group of stalwart companions, we walked 4,200 feet above sea level through both Mt. Aspiring and Fiordland National Parks. Altogether we covered 25 miles, and the entire time it rained, snowed, sleeted and was unutterably mis-

The garden of the late Edgar Stead, a well-known rhododendron hybridizer, contains a wide variety of plants, including rhododendrons and azaleas, as well as *Phormium* (commonly called New Zealand flax) and *Cordyline australis*.

erable weatherwise. Only here and there was I able to see the smattering of a few early flowers. However, the eerie bush appeared as in an unforgettable dream. Within the tree line grows a forest of subtropical *Nothofagus*, a beech-like tree native to the Southern Hemisphere. The forest is crowded and shrouded in mosses, ferns and vines.

During rainy evenings in the huts, I found several botanical references and learned that almost all of New Zealand's alpine flowers are white in color. The reason is not entirely clear, but the color is usually attributed to the fact that pollinating insects were not present when the country's endemic species were evolving. Many of these alpine flowers bear colorful fall fruit. The majority are dioecious; that is, both male and female plants are necessary for fruit production.

Despite the unfavorable weather, all the trekkers reached the end of the trail in high spirits. The scenery had been nothing short of breathtaking.

Unfortunately for most American lovers of alpine plants, our climate is too extreme for many of these plants. High and low temperatures, even in the New Zealand mountains, are more temperate than on most of the North American continent. However, it has always amazed me how exotic species can accommodate themselves to gardens quite dissimilar to their native environment. It would surely be a *tour de force* if I were to succeed in growing some of New Zealand's loveliest species in my own garden.

Throughout New Zealand, plants in public gardens are carefully labeled, adding to the visitor's knowledge and pleasure. Additionally, guided tours may often be arranged, though it is best to do so in advance. Two outstanding books—Palmer's *Manual of Trees and Shrubs* and Salmon's *Field Guide to Alpine Plants*—were invaluable to me in identifying flora everywhere.

At the end of our trek we flew back to Auckland on North Island. A few days later, the words and music of the Maori folk song "Po Ataroa" came to mind: "Now is the hour that we must say good-bye." Our New Zealand journey was over, and we were homeward bound. It was difficult to leave. The warmth and hospitality of every Kiwi we had met was above and beyond anything we had ever experienced. "She'll be right, mate" is a favorite Kiwi expression. For us, everything *was* right about the whole blooming country. ☼

American Horticultural Society members will travel to New Zealand October 15–November 1. For information about this exciting trip, write the Education Department in care of the Society.

Ruby Weinberg is a landscape designer and a former instructor of vocational horticulture. She grows broad-leaved evergreens on her farm in New Jersey.

Nasturtiums

BY JEANNE GOODE

Lolloping all over the garden in reckless disregard for paths and boundaries, nasturtiums were both a joy and a revelation to me last summer. Who could believe that one small packet of seeds would produce such an exuberance of flower and leaf! I vowed to keep them under greater restraint in the future but never to be without them again.

It seems that nasturtiums have often produced this kind of where-have-they-been-all-my-life reaction. Europeans first heard of them in the mid-sixteenth century in a book by Nicolas Monardes that described the medicinal plants and other remedies of the New World. During the height of Spain's power and influence, conquistadors brought their loot home by way of the port city of Seville, where Monardes was a busy and successful physician. To him, the curative seeds, plants, roots and trees were even more valuable than the gold, silver, pearls and emeralds most Spaniards considered the "greatest riches of the Occidental Indias." For 40 years before his book was completed, Monardes eagerly obtained and planted all the South American plants he could, and "made experience thereof, with many and divers persones, with all diligence and foresight possible, and with much happie successe." Although most of the book deals with healing plants and other cures, nasturtiums, known to Monardes as "Floures of Blood," were included just for fun. "I sowed a seede which they brought me from the Peru," he wrote, "more to see his fairnesse, than for any Medicinall vertues that it hath. . . . It is a flower very beautifull, whiche doeth adornate the gardens, and it groweth very well of the seede, or of the Plante."

Monardes's book, published in a first installment in 1569, a second installment in 1571 and a complete edition in 1574, was a great success and was translated from Spanish into several other languages, including Latin, French and English. John Frampton, who published the English translation in 1577, chose the felicitous title *Joyfull Newes Out of the Newe Founde Worlde*. The plants themselves soon followed the "joyfull newes" to other coun-

tries, and the beautiful "floures of blood" were received with as much excitement in pleasure gardens as the medically virtuous plants were in physic gardens. The nasturtium was still among the "outlandish flowers" listed by the herbalist John Gerard in 1577, but by 1629—when John Parkinson wrote his *Paradisi in Sole*—it was "very familiar in most Gardens of any curiosity," a flower of "so great beauty and sweetness withall, that my garden of delight cannot be unfurnished of it."

In England the spurred flowers were called yellow larks' heels and, more often, Indian cress; the taste of both flowers and leaves, described by Monardes as "notable hotte," resembles that of tangy watercress. Nasturtiums contain mustard oil; hence their tangy taste. Nasturtium is an acquired name, borrowed from true watercress, *Nasturtium officinale*. Even though Linnaeus later showed that the plant is not related to the cresses and placed it in its own genus, *Tropaeolum*, the names Indian cress and nasturtium stuck fast and are still used today. Probably this is because nasturtium or Indian cress, like watercress, came to be considered a cure for scurvy, although Monardes had not mentioned that possibility. The English certainly relied on it for this purpose through the seventeenth and much of the eighteenth century. John Evelyn, the diarist, thought nasturtium was "the most effectual and powerful Agent in conquering the cruel enemy." In his *Acequia*, a lyrical discourse on the joys of "sallets," he urged his countrymen to include the plant with other greens for good and healthful eating. The seeds, also believed to be antiscorbutic, were pickled and used as a substitute for capers, and space was found for nasturtiums in kitchens as well as flower gardens.

The early settlers carried seeds of this useful plant to America. Later, as pioneers moved westward, many carried the seeds with them. If conditions had permitted, nasturtiums could have carpeted the ground with golden yellow from coast to coast. Unfortunately, neither plants nor people can hope to enjoy uninterrupted popularity, and by the middle of the nineteenth century, gardeners grew tired of the yellow



Nasturtiums, *Tropaeolum majus*.

flowers and the somewhat unwieldy habits of the familiar Peruvian species, *Tropaeolum majus*. In the meantime, however, new species discovered in Central and South America led to the development of improved hybrids with more color and neater growth habits. Tom Thumb series cultivars, which are upright, dwarf plants available in a wide range of jewel-like colors, and the Gleam series, all semi-trailers, helped to restore nasturtiums' popularity. Throughout the first half of this century, nasturtiums were once again adorning gardens.

Nasturtiums seem to have gone out of style again, judging from the number of people who asked about the plants when they adorned my garden. Perhaps the time is ripe for their revival. Surely no garden should be without these delightful, fragrant annuals with their distinctive, round, green leaves and bright flowers. They are now available with flowers in shades of



Pamela Harper

pale to deep yellow, orange and scarlet-red, rosy-red and pink, and in sizes and forms to suit any gardener's needs. The Tom Thumb cultivars have been improved. The Jewel series cultivars are upright, dwarf, double-flowered plants that grow from 12 to 15 inches in height. The Whirlybird series cultivars are similar and even smaller, about 12 inches in height. The semi-trailing, double-flowered Gleam cultivars will reach about 24 inches in length. The "old-fashioned" single-flowered trailers grow about eight feet in length and are available in various colors, too.

Culture could hardly be easier. Modern cultivars grow as well from seed as the nasturtiums Monardes planted so long ago. Since it takes only six weeks from seed to flower, you can seed plants directly outdoors after the last frost date. For an even longer season, plant them indoors six weeks before that date in individual peat pots so the roots will not be disturbed when

the plants are transplanted.

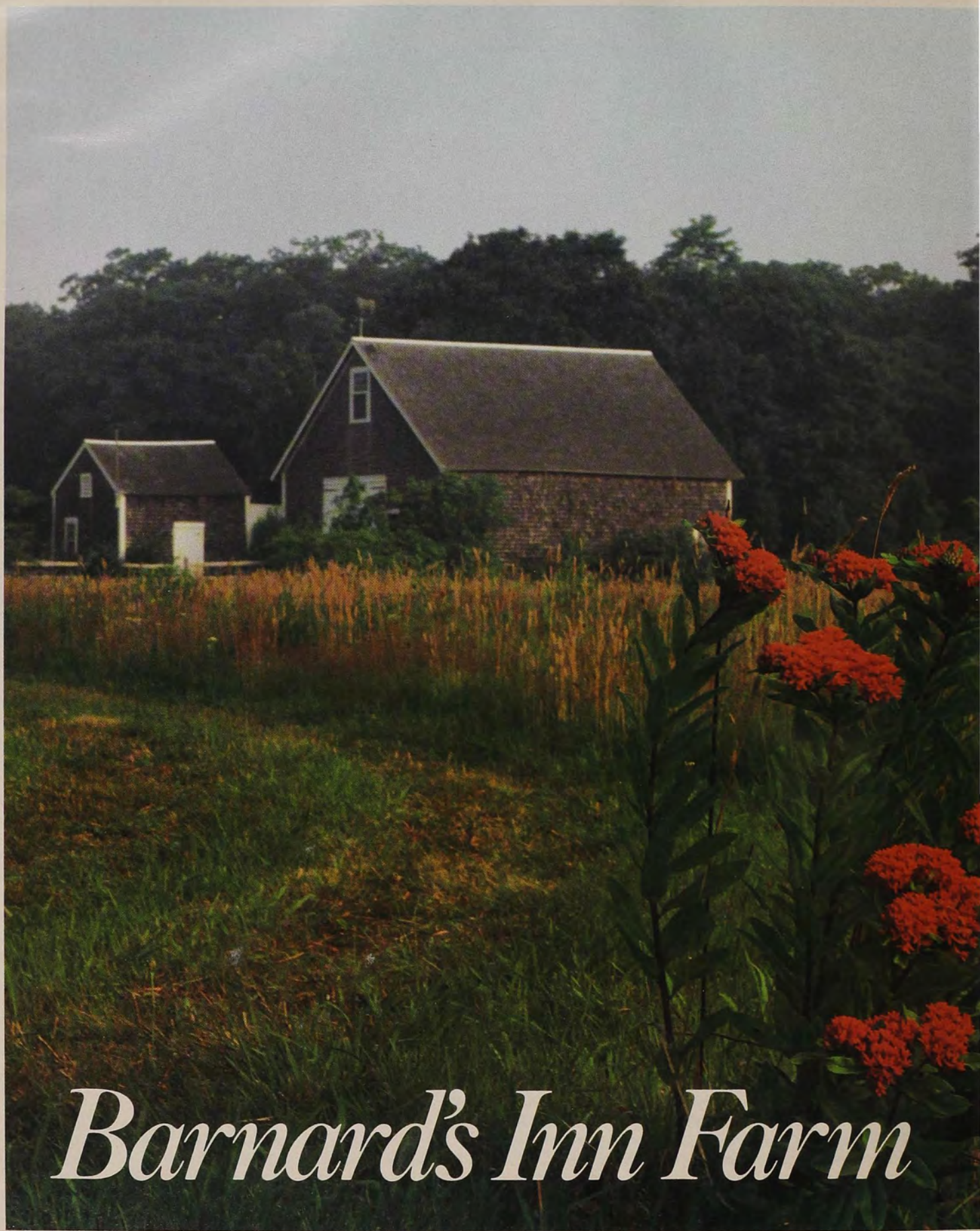
Nasturtiums will thrive in any kind of soil as long as it is well drained and not overly rich in nitrogen; a great amount of nitrogen tends to produce more foliage than flowers. A location in full sun is best but not absolutely necessary. You can expect a generous, if not nearly as prolific, crop of flowers in partial shade. Aphids have been known to find nasturtium leaves irresistible, and some gardeners use the plant in the vegetable garden to trap these sucking insects.

Jewel and Whirlybird cultivars are lovely in beds and borders. If you plant any of the Gleam series, however, give each plant plenty of room in which to sprawl; they are anything but orderly, and have a habit of nudging and eventually enveloping their neighbors. This is done in the nicest possible way, of course, but a gardener with a master plan might well be upset. The eight-foot trailers do not belong in beds

or borders at all unless trained to grow on a trellis or pole. They are also very decorative on fences, and if you have a scraggly patch of lawn, you can let them loose there to make a colorful ground cover. All nasturtiums look splendid spilling out of hanging baskets, window boxes and ornamental urns, and all are free-flowering.

Use the leaves, flowers and stems as a tangy, peppery addition to summer salads, as well as for long-lasting flower arrangements. Cut as many as you like, for they will keep on blooming until frost. Sometime before the first frost—say, September or early October—take stem cuttings of your favorites. They root easily, and if you grow them near a sunny window, they will provide you with flowers of great beauty and fragrance all winter long. ☼

Jeanne Goode is a free-lance writer whose articles have appeared in *American Horticulturist*, *Horticulture* and *Garden*. She gardens in Yonkers, New York.



Barnard's Inn Farm



BY POLLY HILL

Pamela Harper

The village of North Tisbury is in the center of the island of Martha's Vineyard, which lies five miles off the southeast coast of Massachusetts, below Cape Cod. Located on the outskirts of the village, Barnard's Inn Farm presents a typical New England scene. The barns and dwellings are built on an intimate scale, made of time-honored shingled walls and roofs. They are all weathered to a black-gray because of their proximity to salt water. The first home was built in 1697 on land purchased from the Algonquian Indian, Sachem. The additions and other farm buildings followed one by one, and with them, the stone walls.

This land had not been farmed for 30 years or more when my mother and father bought it in 1927. There was a cow barn with a cow and a mule that were tended by a neighbor in the village a short half mile away. There was a hand pump servicing a hand-dug well just outside the kitchen of the seventeenth-century homestead, as well as an outhouse—a four-holer, with two small holes for children. By the big sheep barn was a second well for the animals, capped over and long out of use. No other facilities existed. Electricity had not yet come up-island.

For 30 years my mother joyfully undertook the task of modernizing, but not outwardly altering, these buildings. I like to think that if the long-gone farmers and their wives should come back through the same old front gate and look around, they would still feel at home here. The old barns and buildings, large and small, still harmonize with the stone walls. These structures are simple, quiet, gray and covered, top and sides, with salt-blackened wood shingles. Their proportions and roof lines are satisfying in a timeless way. The moonlight gleams white on the sloping roofs; when snow covers them, they seem to settle into the fields, hibernating. In summer, the simple charms of the old buildings provide a feeling of repose and rest, so treasured in today's world.

Over time this family summer home came under my care. With all the work on the buildings completed, I turned my attention to the land. Although I was only there in the summer months, in 1958 I began to think about growing an arboretum from seed. I longed to try all the beautiful plants I had seen at Longwood Gardens, Win-

terthur and elsewhere, and to test their adaptability to the conditions on Martha's Vineyard. Our dearly loved island seemed to me to be poverty-stricken horticulturally. Would our lean and strongly acidic, sandy soils, our windy, foggy air and our long summer's drought support a wide variety of plants?

I kept reminding myself that I was dealing with an old sheep farm, and that I should only make plans that are compatible with our quiet country setting of shingled buildings and granite walls. Keep it simple, I said to myself, and don't clutter up the open fields. And keep it manageable, since there is no garden staff. Starting from seed gave me considerable time to mull over the landscaping problems.

There are about 4,000 feet of long, rambling walls in the unwooded acres at Barnard's Inn Farm. When one looks beyond the buildings, the walls provide a unifying presence in the 20 or so cleared acres, which are largely surrounded by woods. The walls define the boundaries we share with our neighbors. They isolate and shelter the orchard field, separate it from the west field, define two sides of the north field and disappear into the woods. At one time, the woods were cleared by the early settlers, and all the open pastures were used for sheep raising. Tourism has replaced that industry, but the walls remain, and help to orient our woodland trails and guide us home again. In addition to the walls, there is a simple, flat-topped picket fence, supported on granite posts, that ornaments the front gate and the old homestead on the road. One might think it too elegant for a farm home if it were not so basic, simple and lasting.

There is no record telling us when each stretch of wall was built. Before the walls were built, the Indians roamed these acres—without barriers or boundaries—while hunting or gathering food. But I don't know whether the seventeenth, eighteenth or nineteenth century first saw our walls. I can, however, vouch for the fact that they were not all constructed by the same builders at the same time. It is not difficult to distinguish one section from another by careful observation. Some sections were built on a straight line, while others meander with no clear direction. None of the walls were built with a straight finish line along the top. Consequently, the tops undulate gently, although the fields themselves are reasonably level. Most of our walls are only about four feet high, because the loose arrangement of the stones will

RIGHT: A tall stone gatepost stands beside a lichen- and clematis-covered wall. FAR RIGHT: Granite walls owe much of their color to the crustose lichens that grow on their rough surfaces. The large, tapering rock at the center still shows the drill marks created when the rock was split.



Michael Selig



not tolerate too great a height.

The early settlers moved the rocks by means of a stone boat, resembling a rudderless sled and pulled by mules or oxen. They built the walls over a trench that had been dug to a depth of one foot and filled with two- to four-inch stones and pebbles. The heaviest boulders were laid on top of this foundation, and gradually more wieldy rocks were placed upon the lower ones. Small broken pieces were wedged here and there, and long rocks were placed sometimes vertically, sometimes horizontally and sometimes on an angle. Wall building is an art as well as an engineering feat, but most of all, it is a creative undertaking. Nowadays, a team of two men—one with a tractor and another with a crowbar—can build a wall.

Old granite is beautiful and many-colored. It comes in blackish-gray, reddish-gray and greenish-gray. Much of the color is provided by different species of crustose lichens, mellowed by shadows as the sun moves over them. Snow falls in the crevices

between the rocks, and the wind makes blowholes where the builder left openings too large to hold snow. A blizzard can pile up the snow on the lee side of a wall in sharp, edged peaks, like egg whites ready for a soufflé. The walls are like lace, with open spaces between the solid frame, and are more fragile than their bulk suggests. There is a balance in the whole; take down two stones from the top, and three more may drop at your feet. They should be put back so that their combined weight and balance will firmly support one another again.

Most of the rocks used were boulders known as glacial pebbles, rounded by time and rough weather and transported to their resting places by the glaciers of the last ice age. The rounder the rocks are, the more difficult they are to balance, especially if they are enormously heavy. Occasionally, a rock that was originally planned for a doorstep, a post or a foundation stone, and that had been damaged during the drilling and cutting operation, was used in a wall.



Hollen Johnson

TOP RIGHT: An arbor of European hornbeam, *Carpinus betulus*. FAR RIGHT: Limbed-up *Nyssa sylvatica* trees lining the wall of the west field provide welcome summer shade. The *Stewartia* forest is on the right, and the Far Barn and the el field are in the distance. BELOW: *Prunus maritima*, commonly called beach or shore plum, produces a cloud of white blossoms in spring.



Michael Selig





Hollen Johnson



Polly Hill

In winter, when the grass is down, the walls appear taller than in summer. They are comforting then, in their secure sturdiness, oblivious of storm and gale winds. Deep in the woods beyond them, we see the retreating tree trunks of our forest, but the walls divide the fields from the wild, mysterious woods.

Rocks freshly dug from the ground are usually rusty-brown in color. In two or three years they match the other boulders of dappled gray. In a few more years they gather lichens and develop a greenish cast, shifting in color with the seasons and the humidity. Often, on a rainy day in March, both the walls and tree trunks shine with the green of living plant tissues, bringing hope and cheer after a long New England winter.

One year we had the tops of the walls repaired, since they had become snaggle-toothed. On either side of the wall, often hidden by an accumulation of leaves, were rocks that had tumbled to the ground from the top. Some had been knocked over by deer jumping the walls. Others had been thrown off balance by the heaving of frozen ground. In many cases, a tree had grown too close to the wall so that its roots undermined the all-too-precarious balance of the rocks above. Branches, tossed down by the gales and icy winds of winter, had also fallen from the trees onto the walls, causing rocks to fall. All these rocks were retrieved and laid in the open on one side of the wall. Our helper was an artist, carver of wooden birds, house-painter and collector of Indian relics. He leveled the tops of the walls, making them beautiful in their new repose and finish.

After exploring the neglected, weedy fields one day, my young family and I decided to "liberate" the stone walls. Some were buried in thickets of poison ivy six feet high, with runners reaching as much as 20 feet into the field. Julian, my husband, used a three-gallon tank with bag after bag of Ammate to kill the ivy. The rest of us, armed with loppers and machetes, were the back-up crew. We cut down the trashy volunteers and suckers of wild cherry, locust and arrowwood. Each summer we cleaned up a new stretch of wall. We preserved the red cedar (*Juniperus virginiana*), and shad bush (known locally as wild pear) and the high bush blueberry. We did not disturb the tallest trees—the black locust and the finest spreading black, red and white oaks. The clearing continued until all the walls were free of poison ivy. Next we took on the thorny tangle of cat-

brier, *Smilax rotundifolia*. A young teenage visitor eagerly hacked at a large tangle higher than his head with a small machete until he became discouraged and we came to his rescue. We uncovered a large opening in the wall, which gave new access to the woods from our field. We had never known it was there, so high and thick was the catbrier. Old, hand-forged gate hinges were found lying in the opening. In the process of clearing the mess, we also discovered treasures from our local farm dumps, including whisky, ink and bluing bottles.

The cleaning up and clearing of the walls invited the presence of new plants. The walls' rectangular forms of various dimensions came to be the backbone of my landscape plan.

The walls enclose the smallest field where the apple orchard once grew. The last apple tree fell down in the 1930s, but the wind shelter provided by those four walls and the comparative richness of the soil called for the placing of my nursery in that field. Here I would plant my seeds. To screen this area from the road, I built an arbor just inside the wall. Passers-by, if curious, could watch the arbor take its form but could not see the nursery activity beyond the arbor.

The years passed quickly, and as my seedlings grew, I planted them out in the fields. From the beginning, my plans focused on the walls, leaving the centers of the fields open. I was reluctant to make changes in the familiar aspects of the farm, but there was a field to which no one paid much attention, just west of the nursery field; it became the arboretum field.

One long wall on the west side of the arboretum field is planted with a band of nearly all our native azaleas, from the earliest-blooming *Rhododendron vaseyi*, to the latest *R. prunifolium*. The wall protects them, and they are sheltered and mulched from above by several large, old oak trees. When blooming, the dainty rose-to-white blossoms are shown to advantage against the gray, lichen-covered granite. Various conifers, grouped in a ring around the open center of the field, seem well adapted to these conditions. Indeed, Japanese umbrella pine, *Sciadopitys verticillata*, and Japanese cedar, *Cryptomeria japonica*, seem to grow better here than on the mainland. A short wall on the east side of the arboretum field runs under two 40-foot black oak trees. Between the oaks is an astonishing great-leaved magnolia, *Magnolia*

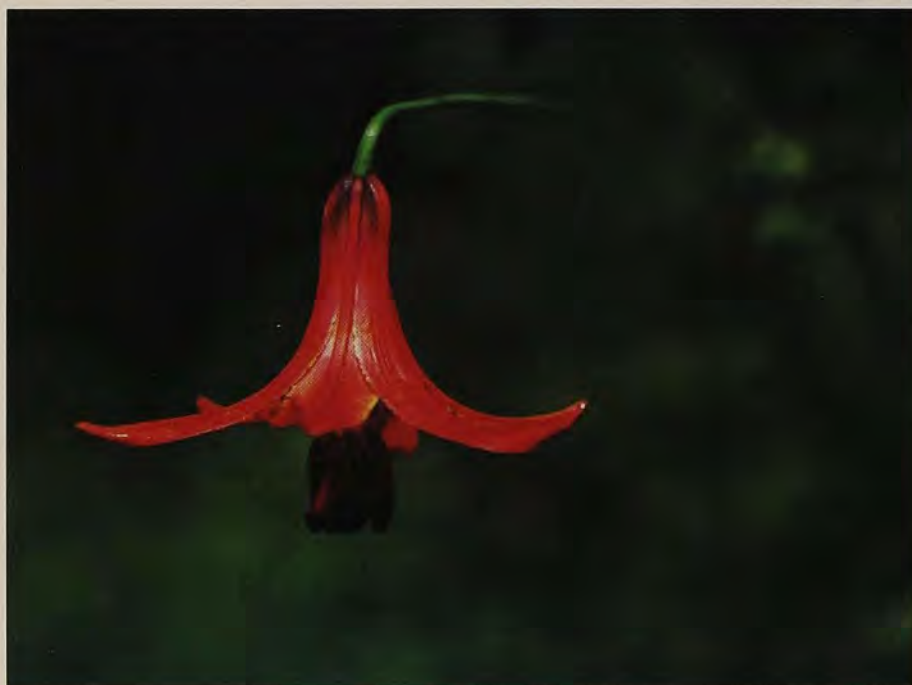
Continued on page 42

Native Lilies

TEXT & PHOTOGRAPHY
BY RICHARD M. ADAMS, II



Lilium michauxii



Lilium canadense



Lilium michiganense

As I kneel in the ditch to observe the lilies, I try to keep my knees from touching the soaked soil. Sweat bees land on the yellow flowers and search for pollen. One of the bees, its black body dusted with yellow pollen, lands directly on the flower stigma, which it is unable to distinguish from an anther. As the bee gropes, some of the pollen collected from another flower adheres to the sticky stigma and cross-pollinates the flower.

Roadside ditches are an ideal habitat for plants that prefer moist but well-drained soil, and the native North American lilies are no exception. Their underground bulbs sprout 12-foot stalks under these conditions. The stalks are tiered with whorls of leaves and bedecked with yellow, orange or red sprays of flowers. Here, among the beer cans and asphalt, are flowers as pretty as those in any florist's refrigerator.

Eight species of lilies grow wild in the eastern United States. They are found all the way from Canada to the Gulf Coast, and from the Atlantic shores to the mid-western prairies. Two of these species, called the upright lilies, have distinctive, upward-pointing, bowl-shaped flowers. They are closely related but easy to tell apart: the wood lily, *Lilium philadelphicum*, has whorled leaves and straight petals; the pine lily, *L. catesbaei*, has separate leaves and flower petals that curve downward at the tips. The other six species, called the nodding lilies, have pendant flowers, as their name suggests. They, too, are closely related but are harder to distinguish than the species of upright lilies. Their downward-pointing flowers are yellow, red and all shades in between. The three sepals and three petals, termed tepals because they look almost alike, curve up and back in varying degrees. The curving tepals form flowers that are thimble-, bell- or turk's-cap-shaped.

Since the seventeenth century, people have been debating over how the native North American lilies should be classified and how they are related to one another—that is, whether certain lilies should be called species, subspecies, varieties or forms. People have often found it difficult to identify a particular plant as one species or another, since some plants show characteristics of both. It is evident that some of the species hybridize where their ranges overlap. These hybrids do not fit descriptions in books. W. B. Turrill, in *A Supplement to Elwes' Monograph of the Genus Lilium*, summed it up when he said, "The North American lilies of the *Lilium canadense* group are taxonomically exceedingly difficult and diverse opinions have been expressed as to the best way to classify them."

To help settle these arguments, we need to look beyond the characteristics themselves and ask, "What evolutionary forces shape and separate the species?" This is where my sweat bee observations play a role.

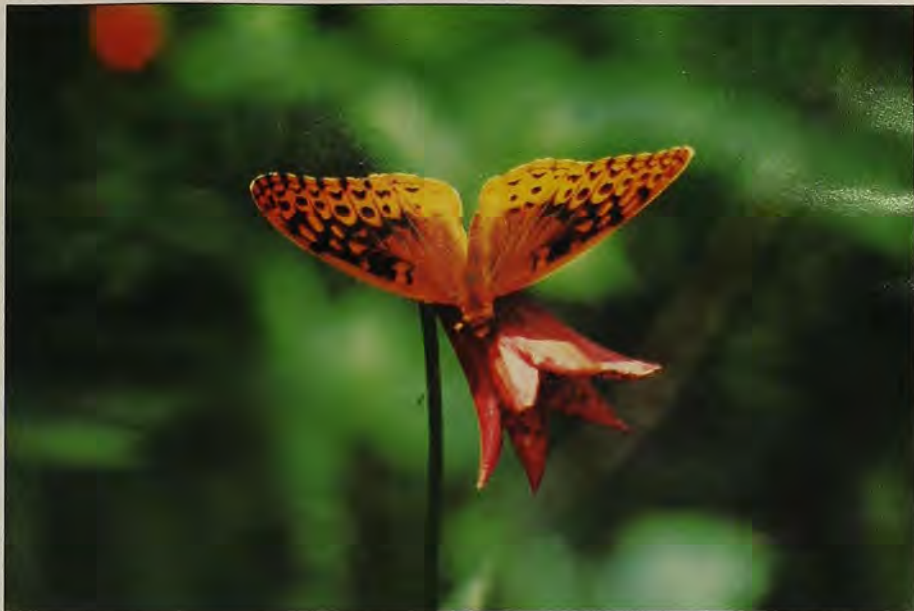
Species & Evolution

As a species' environment varies, so does the species. Gradual changes in ecological factors, such as temperature, soil type, predominant pollinator or moisture, can cause a cline—a gradual change in the characteristics of the species. (The *American Heritage Dictionary* defines cline as "a series of differing characteristics within members of a species or population resulting from gradual changes or transitions in the environment.") Such gradual changes make it difficult to separate or identify individual species, and are a major reason why the members of the nodding lily species are so difficult to distinguish. The following descriptions of the six individual species of nodding lilies and a few of their subspecies provide a good example of the difficulties involved in the identification of lily species.

***Lilium canadense*.** Commonly called Canada lily, this species is found from Nova Scotia to the southern end of the Appalachians, and as far west as Ohio. The bell-shaped flowers exhibit a range of colors, from lemon-yellow in New England to orange and cherry-red in the western portions of their range. This gradual change in color may be due to pollination factors. Sweat bees, which are known to see yellow much better than red, are important pollinators in the East; hummingbirds, which are attracted to red flowers, play an important pollinating role in the western end of the plant's range. Two subspecies are recognized on the basis of these color extremes: the red-orange *L. canadense* subsp. *editorum*, and the yellow *L. canadense* subsp. *canadense*.

***Lilium grayi*.** Named in honor of its discoverer, Asa Gray, Gray's lily is a rare, high-elevation species found in the Blue Ridge Mountains of Virginia and North Carolina. Its flowers seem well adapted to pollination by hummingbirds not only because of their red color, but also because the flowers point outward more than other species, making it easier for the birds to visit. Also, the narrowed, thimble-shaped corolla of this species aids pollination by directing a bird's beak toward the anthers.

Why would a lily evolve to attract hummingbirds? In the mountains, humming-



Lilium grayi



Lilium superbum

birds are more abundant and reliable than another important lily pollinator, the sweat bee. Sweat bees are slowed down by the cooler mountain temperatures and, as ground dwellers, find it hard to build nests in the rocky terrain.

A cline exists between the Gray's lily and the Canada lily; where their ranges overlap, plants with intermediate characteristics are evident. As you travel toward the higher elevations, you will find plants with flowers that are too narrow to be called bell-shaped (as the wildflower books describe Canada lily), but too wide to be described as thimble-shaped (a common description of Gray's lily). There is a gradual change in the species, for there is a gradual change in the importance of their respective pollinators—sweat bees at lower elevations, hummingbirds at higher elevations.

***Lilium superbum*.** Turk's cap or swamp lily, with its reddish-orange, recurved tepals, looks very much like *L. michiganense*, the prairie lily. *L. superbum* is found in eastern temperate forests from Cape Cod almost as far south as the Gulf Coast. Unlike its look-alike, it is often found growing in sopping wet soils. Although it grows in swamps, lowlands and ditches, it seems to prefer dampness resulting from moving, and thus well-aerated, water. Abundant water and sun produce vigorous stalks that reach above a man's head and bear a dozen or more flowers.

L. superbum can be distinguished from prairie lily by looking closely at the flowers. Swamp lily's flowers are red, orange and yellow inside, instead of almost solid orange, and have a small green triangle at the base. The two species do not seem to hybridize; their distributions do not overlap significantly, and they bloom at different times—*L. michiganense* in early July, *L. superbum* in late July.

Butterfly pollination may help explain the recurved tepals of some lily species, although sweat bees and hummingbirds also pollinate them. A fritillary butterfly will sip nectar through the "back door" of a Gray's lily bloom by inserting its proboscis between the tepals and retreating without pollinating the flower. The recurved tepals of *L. superbum* force the butterfly around to the front of the flower, where its wings contact the anthers and stigma, and cross-pollinate the flower.

***Lilium michauxii*.** Commonly called Michaux's lily, this species is also called southern swamp lily, because it looks like *L. superbum*, swamp lily, and is common in the South. *L. michauxii* seems better adapted to drier soils



Lilium iridollae

than does *L. superbum*; its stalks are short, typically under three feet tall, and it bears only a few thick, almost succulent leaves. Its flowers are usually borne singly, and there are seldom more than three flowers per stalk. All of these features reduce water loss and help the species adapt to the dry slopes, from the southern Appalachians to the Gulf Coast, where it is found. Perhaps to compensate for the plant's drought-imposed small size, the flowers are large, showy and fragrant—all features that help attract pollinating sweat bees, butterflies and hummingbirds.

Seldom do *L. michauxii* and *L. superbum* hybridize; the former grows in dry soils and blooms in early August, while the latter grows in wet soils and blooms in late July.

***Lilium michiganense*.** Prairie or Michigan lily is found in the midwestern prairie region, where soils are drier and more alkaline than in the eastern temperate forests. The prairie lily, with its thicker leaves and higher soil pH preference, seems adapted to this habitat. Its evolution has favored no single pollinator; sweat bees, butterflies and hummingbirds all visit the orange flowers.

Environmental conditions can also help separate species, as in the case of *Lilium michiganense* and *L. canadense* subsp. *editorum*. On the eastern end of the prairie lily's range, where the midwestern limestone soils give way to the eastern sandstone soils, soil acidity and moisture conditions help separate the prairie lily from the Canada lily. Flowering time also helps separate these two species. Throughout most of their ranges, they bloom at about the same time; however, as the range of one approaches the range of the other, prairie lily blooms earlier and Canada lily blooms later. This phenomenon is called character displacement.

Why are the two species trying to avoid

each other? If hybrids are intermediate and can survive only where the environment is intermediate, it is probably advantageous if fewer unfit hybrids are produced. Such isolating mechanisms restrict hybridization and can help identify species and settle arguments about classification. In this case, they help justify calling *L. michiganense* a species rather than a subspecies or a variety of *L. canadense*. This isolating mechanism is incomplete, however, and some *L. canadense* X *L. michiganense* hybrids have been found. These intermediate plants can survive only where the environment, too, is intermediate, along the boundary between the temperate forest and the prairie.

***Lilium iridollae*.** Pot-of-gold lily is a denizen of Gulf Coast swamps. Just described in 1946, it is found only in a small area of Alabama and the Florida Panhandle. Like *L. superbum*, it prefers moist conditions, but it has mostly yellow flowers. Its thickened leaves and fragrant flowers resemble those of *L. michauxii*. Hybrids between *L. superbum* and *L. michauxii* do not look like *L. iridollae*. The origin of this rare species, which is being considered for listing as Endangered, remains a mystery.

Culture

Lilies look lovely not only in roadside ditches, but also in gardens or wooded areas. Here are some suggestions for growing them.

Soil. All of the eastern American lily species prefer acidic soils, except *L. michiganense*, which grows in soils of approximately neutral pH. In cultivation, all are adaptable to a slightly acidic pH of 5.0-6.5. Alkaline soils, with a pH of 8 or greater, may reduce the availability of iron and

cause leaf-yellowing. This situation can be alleviated by adding peat, sulfur (one ounce per square yard) or chelated iron to the soil.

Native lilies are adaptable to soils of all textures, from sandy soils, to silts, loams, peats and even heavy clay. Heavier soils may lack adequate drainage and may not be well aerated. Ideally, the soil should be both well aerated and moisture-retentive. Add organic matter to increase the water-holding capacity of the soil. Drainage can also be improved by planting in raised beds.

Planting. Fall is the best time to plant or move lily bulbs. Lilies look best if planted in groups of five or more. Start by digging a hole twice the diameter of the bulb and slightly deeper than the recommended planting depth, as determined by the following formula: Plant a mature bulb with its top at a depth $2\frac{1}{2}$ times its height. For example, a two-inch-high bulb would be planted with its tip five inches below the surface, requiring a hole at least eight inches deep (five inches for covering soil, plus two inches for the bulb's height, plus one inch for fill). Seedlings and very young bulbs should be planted closer to the surface; the plant has contractile roots that will actually shorten, pulling the bulbs down as they mature. Fill in the bottom of the hole with loose soil, set the bulb upright, spread out its roots and add soil slowly. Be sure not to leave any air space. Label the planting so you can tell what it is and will know where the bulbs are when they are dormant.

Light. Ideally, plants should be located where the shoots can receive full sun but where the soil is shaded by small shrubs or other plants, both of which help keep the soil cool and reduce water loss. In warmer climates, some protection from the hot afternoon sun is beneficial.

Hardiness. Temperate lily species become dormant in the winter. They require a cold period (vernalization) for normal growth and flowering the next year. In nature they experience temperatures from near freezing (*L. iridollae* near the Gulf Coast, U.S.D.A. Zone 9) to -40°F (*L. canadense* in southern Canada, U.S.D.A. Zone 2). In my experience all species are hardy in Ithaca, New York (-20°F , U.S.D.A. Zone 5). (*L. iridollae* was not evaluated.)

When newly planted bulbs face a severe winter with slight snow cover, apply a one- to three-inch layer of leaves, evergreen branches or other mulch. Well-established lilies do not usually need mulching. Good drainage improves winter hardiness; water expands as it freezes, and in the winter,

waterlogged soil may heave and split the bulbs.

Propagation. Lilies can be propagated asexually by separation, scaling and tissue culture—methods that retain the characteristics of the parent but also transmit any fungal or viral diseases to the offspring. Sexual propagation, by seed, stems the transmission of these diseases and will also result in variations in the offspring.

Eastern American lily species, with few exceptions, are stoloniferous and produce a new bulb every year. (The stolons in the exceptions—*L. michauxii*, *L. philadelphicum* and *L. catesbaei*—are very short.) Vigorous plants often produce two or more new bulbs, evident from the multiple shoots that appear close together. These plants can be divided to produce new clumps.

A lily bulb is a dense cluster of scales, which are actually modified leaves that are specially suited for over-winter food storage. When broken off the bulb, scales start growing one or more bulblets near their bases. These bulblets eventually grow into new plants.

Scale-propagated plants will generally produce above-ground growth within one year and will flower within two. Scaling may be done just after flowering, while the stem is still green; but, for better results, wait until the stems begin to die down. Dig up the bulb, remove the desired number of scales, dust the scales and bulb wounds with fungicide, and replant the bulb, which will not be injured if only a few scales are removed. Plant the scales an inch or less apart in rows six inches apart, and cover them with about one inch of soil. The scales may produce some growth above ground before fall. Just before frost, cover them with an additional two to three inches of soil and two to three inches of mulch. In spring, remove the mulch before growth begins. The bulblets may be moved to permanent locations the next fall.

Lilies can also be propagated by seed, but they will produce few, if any, seeds when pollinated by the same plant or clone. Since they require pollen from a different clone for effective pollination, they are called self-incompatible or obligate outcrossers. To make cross-pollination (rather than self-pollination) even more certain, the anthers on a given flower mature before the stigma. This characteristic is called protandry, from the Latin *pro*, meaning first, and *andros*, meaning male.

To pollinate the flowers, first gather pollen from the pollen parent by removing the unopened anthers and drying them on clean paper in a warm, dry atmosphere. As they dry, the anthers open and shed

their pollen. Refrigerated, pollen remains viable up to 10 months; frozen, up to two years. To pollinate the seed parent, open a mature bud, remove the anthers, and brush pollen over the stigma with pieces of pipe cleaner or another disposable applicator. To prevent contamination, don't use the same applicator for more than one kind of pollen, and wash your hands after each pollination. To get the most seeds, spread pollen over the entire stigmatic surface. Cover the stigma with foil, or the entire flower with a bag, to guard against insect-caused pollination with other plants. You will know when fertilization has been successful and it is safe to remove the cover, because the flower will fade rapidly, the flower stalk will bend back and the ovary will swell. Gather seed just before the capsule splits open, in a few weeks.

In nature, the seeds of eastern American lily species fall to the ground in late summer, are stimulated to germinate by the winter cold, and germinate the following spring. You will be unable to tell the seeds have germinated until the following year, though, because the first year's growth is a bulblet that remains underground all summer and does not send up leaves until the second spring. Germination is thus termed hypogeal, from the Greek *hypo*, meaning under, and *geos*, meaning earth.

Each fall at the Oregon Bulb Farms, a top lily grower, millions of seeds ripen. They are immediately dried and stored in huge freezer rooms. Frozen, the seeds remain viable for 20 years. Seeds are planted in February. The as-yet unapparent hypogeal seedling bulblets are vernalized over the winter and then planted in the ground the following February, having spent one year in the seed flat. (These planting times for Oregon's mild climate may, of course, need to be adjusted for your local conditions.)

Before sowing seed, dust it with a fungicide such as Captan or Thiram by putting the seeds and fungicide in a bottle and shaking. Sow the seeds about six inches deep in a sterile, light, soilless mix or in fine vermiculite. Premoisten the medium and let it drain until damp. Place the container in a perforated plastic bag to help keep the medium moist.

Pot Culture. Lilies are easy to grow in pots if they have good light, good drainage and fertile soil, and are provided with the winter dormancy period they require. Use pots eight to 10 inches or larger, and plant several bulbs to a pot for fullness. Soilless mixes are excellent; they provide good drainage and are well aerated. Be prepared to control pests such as aphids and diseases such as botrytis; infestations can build up

faster on plants grown close together. Keep the soil constantly moist, but make sure the pot is not standing in water. Fertilize the plants when growth is active. Reduce water after flowering; lilies in pot culture tend to die back at this time. Overwinter the pots in a cool (under 40° F) location—a cold frame, cool greenhouse, garage or outdoors; the bulbs can survive frost.

Fertilization. Lilies grow in spite of the poor soils in which they are found in the wild, where the levels of nitrogen, potassium and phosphorus are often too low to be detected in soil lab analyses. Early plant explorers, noting these poor soils, incorrectly deduced that cultivated lilies do not need much fertility. Although lilies may not be able to compete with other plants on more fertile soils, they benefit from fertilization when cultivated and removed from competition. Fertilize in early spring with a balanced fertilizer. Over-fertilization, particularly with nitrogen, often results in basal rot.

Viruses. Native lilies are highly susceptible to viruses. Leaves may become streaked or mottled, and the bulbs may weaken and simply disappear. There is no cure, so infected bulbs must be destroyed. As a preventive measure, plant native lilies away from fancy-named hybrids. Hybrid lilies tolerate viruses, often without showing symptoms, and nearby species can become infected when the virus is transmitted by aphids.

Conservation

To the conservationist's consternation, most people acquire these lovely native lilies by digging them up in the wild or buying collected plants from a nursery. Collection reduces the numbers of plants in wild populations, and adds species to rare and endangered lists. To combat this problem, the New England Wild Flower Society has helped fund research in tissue culture propagation of these rare lilies. Seven beautiful cultivars, which were originally collected by the author, have been named and propagated by tissue culture. The availability of tissue-cultured plants will allow gardeners to acquire native lilies without contributing to their disappearance in the wild. (See the Sources section on page 37 for a brief description of these cultivars and for information on how to order them.)

Richard M. Adams, II, is the curator at the Mt. Cuba Center in Greenville, Delaware.

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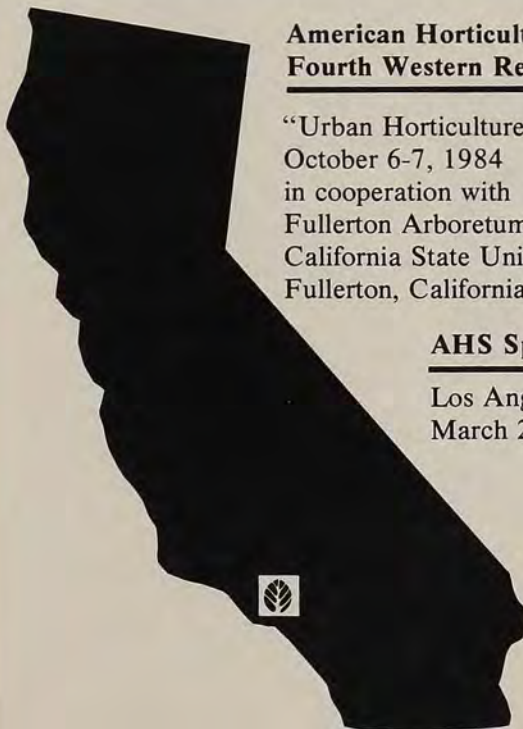
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Pronunciation Guide

The accent, or emphasis, falls on the syllable that appears in capital letters. The vowels that you see standing alone are pronounced as follows:

i—short sound; sounds like i in “hit”
o—long sound; sounds like o in “snow”
a—long sound; sounds like a in “hay”

Acacia ah-KAY-see-ah
Aciphylla lecomtei
ak-i-PHYLL-ah lee-COM-tee-eye
Aletris ah-LET-triss
Antennaria an-ten-NAIR-ee-ah
Aquilegia akitensis
ak-qui-LEE-jee-ah ah-kit-EN-sis
A. flabellata var. *pumila*
a. fla-bell-AY-tah PEW-mi-la
Asclepias tuberosa
ass-KLEE-pi-uss too-bur- O-sa
Banksia grandis BANKS-ee-ah GRAND-iss
B. integrifolia b. in-teg-ri-FO-lee-ah
B. media b. MEE-dee-ah
B. meisneri b. MICE-ner-eye
B. occidentalis b. ock-si-den-TAY-liss
B. serrata b. ser-AY-ta
B. speciosa b. spee-see-O-sa
Carpinus betulus car-PY-nuss BET-yew-lus
Cassiope cass-EYE-o-pee
Celmisia cell-MISS-ee-ah
Clematis montana var. *rubens*
CLEM-ah-tiss/clem-AT-iss mon-TAN-ah
REW-benz

Cordyline australis
cor-dee-LY-nee os-TRAIL-is
Cornus kousa KOR-nus KOO-sa
Cryptomeria japonica
krip-toe-MEER-ee-ah ja-PON-i-ka
Cyathea medullaris
cy-AH-the-ah med-you-LAIR-iss
Cyclamen persicum
SYKE-la-men/SICK-la-men PER-si-kum
Cynara sigh-NAR-ah
Daphne DAFF-ne
Disa uniflora
DEE-sa you-ni-FLOR-ah
Disporum smithii
di-SPORE-um SMITH-ee-eye
Dryandra dry-AN-dra
Embothrium coccineum
em-BOTH-ree-um cock-SIN-ee-um
Epimedium ep-i-MEAD-ee-um
Erica carnea
AIR-i-ka CAR-nee-ah
Eucalyptus you-ka-LIP-tuss
Finschia FIN-she-ah
Galium boreale
GAY-lee-um bore-ee-ALL-ee
Gentiana verna
jent-tee-AY-na VER-na
Gevuina avellana
jev-YOU-ee-na av-el-LAY-nah
Gladiolus glad-ee-O-lus
Grevillea robusta
gre-VILL-ee-ah ro-BUSS-tah
Gunnera chilensis GUN-er-ah chi-LEN-sis
G. magellanica g. madge-el-LAN-i-ka
G. prorepens g. pro-REE-penz
G. tinctoria g. tink-TOR-ee-ah
Hakea HAH-kee-ah
Hebe HEE-bee
Hedyotis caerulea
head-ee-O-tiss see-REW-lee-ah
Helicia diversifolia
hel-ISS-ee-ah di-vers-i-FOL-ee-ah
Hemerocallis
hem-er-o-KAL-iss/hem-er-OCK-a-liss
Hicksbeachia pinnatifolia
hicks-BEECH-ee-ah pin-at-i-FOL-ee-ah
Hypericum hy-PEAR-i-kum
Iberis EYE-ber-iss
Iris EYE-riss
Juniperus virginiana
jew-NIP-er-us nee-jin-ee-AY-na
Leptospermum scoparium
lep-toe-SPER-mum sco-PAIR-ee-um
Leucodendron leu-co-DEN-dron
Leucospermum argenteum
leu-co-SPUR-mum ar-JEN-tee-um
Lilium canadense
LIL-ee-um can-ah-DEN-see
L. catesbaei l. CATES-bee-eye
L. editorum l. ed-i-TOR-um

L. grayi l. GRAY-eye
L. iridollae l. i-rih-DOLL-ee
L. michauxii l. mee-SHOW-see-eye
L. michiganense l. mich-i-gan-EN-see
L. philadelphicum l. fill-ah-DELL-fi-cum
L. superbum l. sue-PER-bum
Lithospermum lith-oh-SPER-mum
Macadamia integrifolia
mac-ah-DAME-ee-ah in-teg-ri-FO-lee-ah
M. tetraphylla m. te-tra-PHYLL-ah
Magnolia macrophylla
mag-NOL-ya mack-ro-FILL-ah
Nasturtium officinale
nass-TUR-tee-um o-fiss-i-NAL-ee
Nothofagus no-tho-FAG-uss
Nyssa sylvatica NISS-ah sil-VAT-i-ka
Olearia oh-LEAR-ee-ah
Ourisia our-RISS-ee-ah
Parahebe para-HE-be
Parthenocissus quinquefolia
par-thin-o-SIS-us quin-qui-FOL-ee-ah
Phormium tenax FORM-ee-um TAY-nacks
Platanthera lacera
pla-tan-THER-ah lah-CER-ah
Pleione PLEE-o-nee
Potentilla po-ten-TILL-ah
Protea cynaroides
PRO-tee-ah cy-NAR-oh-eye-deez
P. nitida p. nit-EYE-dah
P. repens p. REE-penz
Prunus maritima var. *rubens*
PRUNE-us ma-RIT-i-ma
Ranunculus ra-NUN-kew-lus
Raoulia ra-OUL-ee-ah
Rhododendron atlanticum
ro-do-DEN-dron at-LAN-ti-cum
R. prunifolium r. prune-i-FOL-ee-um
R. vaseyi r. VAZ-ee-eye
Rhodohypoxis baurii
row-do-hy-POCKS-iss BOW-ree-eye
Robinia pseudoacacia
rob-IN-ee-ah sue-do-ah-CASE-ee-ah
Saxifraga sacks-i-FRAYGE-ah
Sciadopitys verticillata
sy-ah-DOE-pit-us ver-tis-ill-AY-ta
Serruria florida
ser-REW-ree-ah FLOR-i-da
Shortia SHORT-ee-ah
Smilax rotundifolia
SMY-lax row-tun-di-FOL-ee-ah
Solidago nemoralis
sol-i-DAY-go nee-more-AL-iss
Sphaopteris medullaris
spay-er-OP-ter-iss med-you-LAIR-iss
Spiranthes spy-RAN-theez
Stewartia stew-ART-ee-ah
Telopea speciosissima
tee-LOW-pee-ah spee-see-oh-SISS-i-mah
Tropaeolum majus
tro-pee-O-lum MAY-jus
Vancouveria van-koo-ver-EE-ah

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Sources

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Chiltern Seeds (Bortree Stile, Ulverston, Cumbria LA12 7PB, England, catalogue \$1.50) offers *Disa* seed. They supply complete and accurate germination instructions with every packet.

Gardeners who would like to purchase *Disa* plants should write to Dr. Stoutamire, 3615 Mogadore Road, Mogadore, OH 44260.

NEW ZEALAND—A GARDEN TOUR

Gardeners who would like to visit New Zealand should write to one of the following New Zealand Government Tourist Offices for more information.

New Zealand Tourist Office, Suite 970, Alcoa Building, 1 Maritime Plaza, San Francisco, CA 94111, (415) 788-7404.

New Zealand Tourist Office, Suite 1530, 10960 Wilshire Boulevard, Los Angeles, CA 90024, (213) 477-8241.

New Zealand Tourist Office, Suite 530, 630 Fifth Avenue, New York, NY 10111, (212) 586-0060.

For more information on the American Horticultural Society's October 15-November 1 tour of New Zealand, write to the Education Department, American Horticultural Society, PO Box 0105, Mount Vernon, VA 22121, (703) 768-5700.

BARNARD'S INN FARM

Although Barnard's Inn Farm is a private garden, Polly Hill does welcome visits from interested horticulturists and gardeners. To make arrangements for a visit, write to Polly Hill in care of the American Horticultural Society, PO Box 0105, Mount Vernon, VA 22121.

NATIVE LILIES

B&D Lilies (330 P Street, Port Townsend, WA 98368, catalogue \$1.00) is the only retail mail-order source for the seven tissue-cultured cultivars of North American lilies that have been released. (Wholesalers can write to B&B Laboratories, 1600-D Dunbar Road, Mt. Vernon, WA 98273,



(206) 424-5647 for a price list.)

The following cultivars are available:

Lilium canadense subsp. *canadense* 'Ten-Gallon Turkscap'. Petals and sepals unusually long and narrow, suggesting a ten-gallon hat.

L. canadense subsp. *canadense* 'Peaches and Pepper'. Peach-orange with a sprinkling of fine spots.

L. canadense subsp. *canadense* 'Melted Spots'. Yellow flowers blackened inside with spots.

L. canadense subsp. *editorum* 'Fire Engine'. Flowers bright red.

L. canadense subsp. *editorum* 'Chocolate Chips'. Red flowers with unusually large spots.

L. grayi 'Gulliver's Thimble'. Vigorous grower with large, bright red flowers.

L. iridollae. An unnamed clone of this rare species.

Readers interested in lilies may want to join the North American Lily Society, Inc. For information, write Mrs. Dorothy B. Schaefer, Executive Secretary, NALS, PO Box 476, Waukegan, IA 50263.

Anyone interested in growing and conserving native wildflowers should consider joining the New England Wild Flower Society. For information, write New England Wild Flower Society, Inc., Garden in the Woods, Dept. AHS, Hemenway Road, Framingham, MA 01701.

NASTURTIUMS

Nasturtium seed is readily available from most garden centers, nurseries and mail-order seed firms. The following companies offer several cultivars.

Agway, Inc., PO Box 487, Elizabethtown, PA 17022, catalogue free.

W. Atlee Burpee Company, Warminster, PA 18991, catalogue free.

Comstock, Ferre & Company, 263 Main Street, Wethersfield, CT 06109, catalogue free.

Geo. W. Park Seed Company, Inc., PO Box 31, Greenwood, SC 29647, catalogue free.

Thompson and Morgan, PO Box 100, Farmingdale, NJ 07727, catalogue free.

THE PROTEA FAMILY

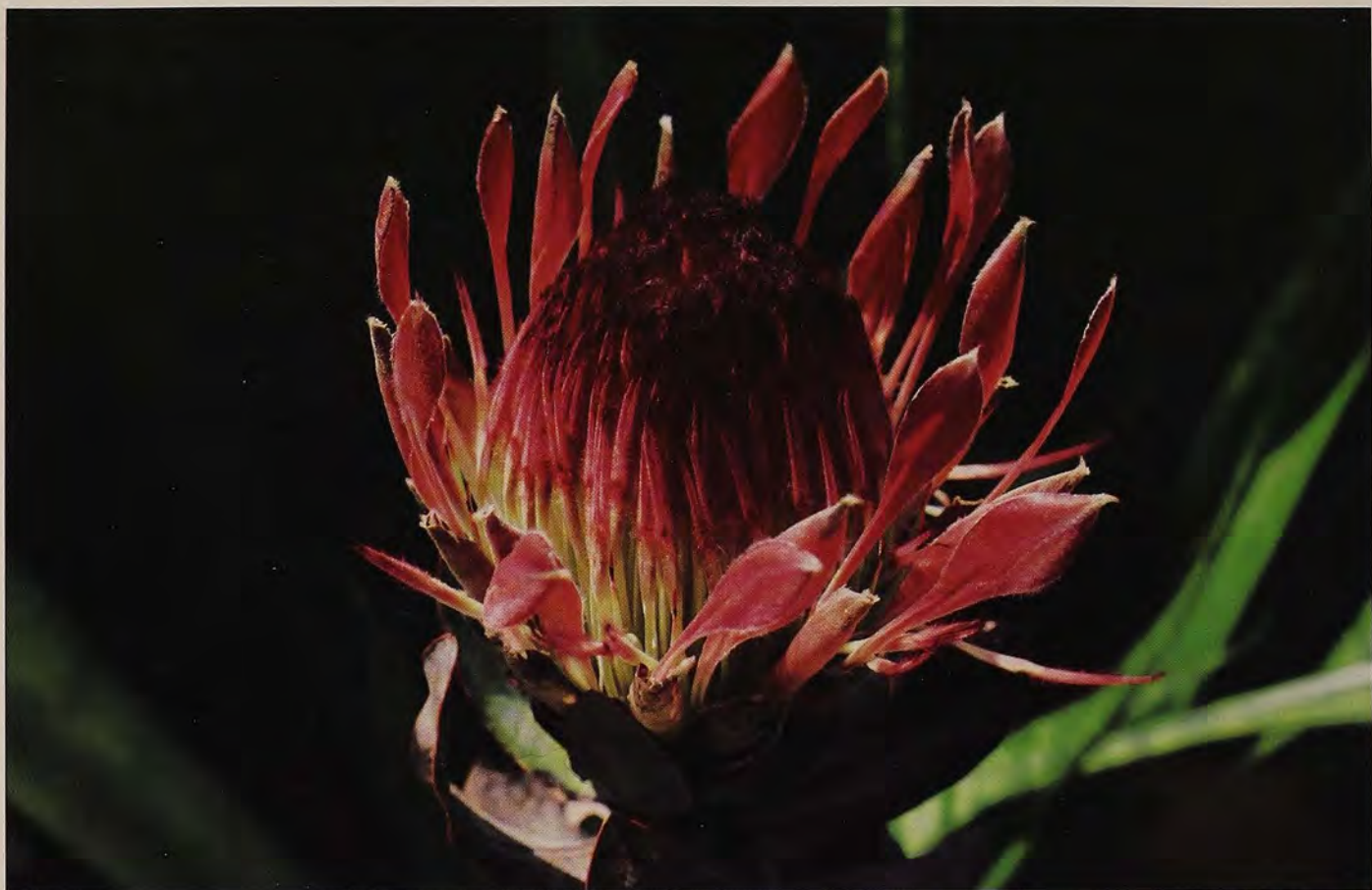
Protea family members are not readily available through mail-order sources, but gardeners in warmer regions of the country may find them at local nurseries and garden centers. In the North, *Grevillea* seedlings can be found in some tropical plant stores. The following companies offer seed of some of these beautiful plants.

J. L. Hudson, Seedsman, PO Box 1058, Redwood City, CA 94064, catalogue \$1.00. Offers an excellent selection of *Protea* species and also lists *Grevillea*.

Thompson and Morgan, PO Box 100, Farmingdale, NJ 07727, catalogue free. Lists *Banksia* and *Embothrium*.

International Seed Supplies, PO Box 538, Nowra. 2541, N.S.W. Australia, catalogue free. Offers *Protea*, *Macadamia*, *Grevillea* and *Telopea*.

The Protea Family



Bonnie Stutski

According to Greek mythology, Proteus was a prophetic old man of the sea who could change himself into any shape he pleased. Appropriately, Linnaeus selected the name *Protea* for a group of South African plants of great variety that he knew only from a collection of engravings. He included the proteas in his *Systema Naturae* in 1735.

Dutch traders sailing around the Cape of Good Hope first brought tantalizing fragments of the bizarre and unknown African flora to Holland and Britain in the sixteenth and seventeenth centuries. Individual specimens created a sensation, and their uniqueness aroused a sense of wonder. From the time the Dutch first occupied the Cape of Good Hope, they had assembled portfolios of watercolors depicting the flora and fauna of their distant outpost.

Paintings made at the Cape were eventually used to make engravings of these exotic plants.

Eventually, the group of plants known as *Protea* gave its name to the Proteaceae, a family of some 55 genera and 1,200 species of trees and shrubs that are found in southern Africa, Asia, Australia, and Central and South America. They are especially prevalent in areas with long, annual dry seasons. The family provides numerous examples of links between the floras of South America, South Africa, Australia and Asia.

The structure of the flower head is the distinctive feature of the protea family. The flowers, insignificant in themselves, are often grouped in showy spikes or heads surrounded by rings of bracts. They are petalless but have petal-like sepals. For the

most part, they are bisexual, although in some instances male and female flowers appear on separate plants. The fruits are nuts, drupes or capsules, and the seeds are often winged.

Almost all Proteaceae are trees or shrubs with alternate, entire or variously divided leaves that are leathery and have a thick cuticle. The leaves are also sometimes hairy. These characteristics aid in conserving water, an important adaptation that helps these plants survive in their native environment.

The genus *Protea* consists of 100 species, most of which are from the Cape region of South Africa. Proteas are one of the most characteristic elements of the unique Cape flora. Of all the diverse plant groups that make up South Africa's wonderfully rich flora, few genera are as widely



Leon Nedbalek



Leon Nedbalek

FAR LEFT: *Protea* blossoms are a common sight in florist shops. The flower heads are attractive fresh or dried. LEFT: *Grevillea robusta*, silky oak, is an attractive ornamental in warm climates. It is grown for its fern-like foliage and showy blooms. ABOVE: *Macadamia integrifolia*, smooth-shelled macadamia, is the most commonly grown species in nut-producing countries.

known or as immediately recognized as *Protea*. The solitary flower heads are said to look like glorified artichokes. The name given king protea, *Protea cynaroides*, is based on this resemblance; *Cynara* is the generic name for artichoke. The bracts—the showy parts of the king protea's large flower head—are often rigid and rosy-pink, with silky hairs on the outside that overlap one another like the scales of an artichoke. When heads of *P. cynaroides* open, they are full of honey and are called honey pots.

James Petiver, an apothecary from London, published the first description of *P. cynaroides* in 1698 from a dried specimen. King protea was introduced to Kew Gardens in 1774. Although all the *Protea* species were thought of as South Africa's national flower, it was not until 1976 that *P. cynaroides* officially became that coun-

try's national flower.

Of all the woody plants of the Cape region that could be pressed into service by the resourceful pioneers from the Northern Hemisphere, proteas were the most abundant and most readily available. Protea wood provided fires for warmth and for cooking. The bark was used for tanning, and the wood (notably from *P. nitida*, the wagon tree), for building wagons, small furniture and other small articles. *P. repens*, sugarbush, was one of the most heavily exploited shrubs during the first 200 years of Cape Town's existence. The copious nectar produced by the flowers was thickened to produce a nutritious syrup when other sweetening agents were unavailable. This syrup was later found to be highly effective in curing coughs and other chest ailments. Preparation of this

syrup, called *bossiestroop*, was apparently an established custom by the end of the seventeenth century. *P. repens* has the distinction of being the first *Protea* to be brought into flower outside of the Cape region.

P. nitida, with its shining white foliage, was introduced to Kew Gardens in 1787, and it flowered and produced seed in English greenhouses. All forms of this species have a high degree of fire resistance; dwarf forms regenerate from basal lignotubers, while tree forms are protected by exceptionally thick layers of bark.

In the twentieth century, botanical collecting in South Africa intensified, and exploration in the Cape mountains and remote areas brought forth new discoveries resulting in the addition of many new named species to the genus *Protea*.

The macadamia nut, long considered one of the finest nuts in the world, is also a product of the protea family. Native to Australia, macadamia nuts were eaten regularly by the aborigines. When European settlers arrived, they quickly developed an appreciation for the nuts. In 1858 the botanist Ferdinand von Mueller collected and described the tree from which the nuts originate. He named it *Macadamia*, in honor of John Macadam, Secretary of the Philosophical Institute of Victoria, Australia.

There are 10 species of *Macadamia*. The only two having edible nuts are found on the eastern slopes of the mountains along the east coast of Australia, an area covered by a dense rain forest. They are *M. integrifolia*, smooth-shelled macadamia, and *M. tetraphylla*, rough-shelled macadamia. There is considerable variation within the two individual species, which hybridize when grown close together. The tree is a small evergreen with whorled leaves and tasseled flowers borne in pendant racemes. The flowers are followed by extremely hard-shelled nuts in clusters of a dozen or more. The trees bear continuously when mature. Since ripe nuts are difficult to distinguish from immature nuts when still on the tree, the nuts are commonly harvested from the ground. The tree also yields fine-grained, reddish cabinet wood, but the most valuable product from this tree is the nut crop.

STRANGE RELATIVES

Macadamia seeds are reported to have been first planted in Hawaii in 1878 and in California in 1879. In Hawaii, macadamia trees were planted in the 1890s for reforestation projects, a use for which the tree proved unsatisfactory. They were also planted in gardens as an ornamental, and in orchards as a source of nuts. Soon, thousands of macadamia trees were growing on the islands, and a nut industry developed. The University of Hawaii undertook a survey and evaluation of macadamias, then propagated the most promising types. In 1948 and 1952, these researchers introduced cultivars with the best production records and adaptability to Hawaiian climates. During the early years of the industry, researchers discarded all *M. tetraphylla* selections and restricted their attention to *M. integrifolia*. Today, these cultivars of *M. integrifolia* have found favor in all of the nut-growing countries that have a tropical climate. The Hawaiian cultivars were introduced to California after World War II. *M. tetraphylla* has proved to be better adapted to California's subtropical, warm dry climate than to Hawaii's climate. Researchers in Florida, where the soils are different and the climate is more tropical, are still testing to find adapted cultivars.

Macadamias have been growing for at least 40 years in South Africa, where they seem to perform better than in their native Australia. It is estimated that South Africa is second only to Hawaii in the number of acres of macadamias under cultivation. Besides South Africa and Australia, a few other tropical countries also produce macadamia nuts commercially.

Close kin to *Macadamia* are some other nut-bearing trees of the protea family. *Gevuina avellana*, commonly called Chile hazel, is occasionally grown in Zone 10 regions of California. Its cherry-size fruit yields an edible kernel much like hazelnut in appearance and flavor. This evergreen tree from southern Chile is also a source of wood for furniture, picture frames, shingles and small, turned wooden objects.

The *Finschia* species from New Guinea and nearby islands are the source of seven kinds of edible nuts. The Australian red-nut, *Hicksbeachia pinnatifolia*, and *Helicia diversifolia*, both bear nuts that may be eaten out of hand. A few other tropical genera produce nuts containing poisonous substances that must be removed by boiling or roasting before the nuts are eaten.

The largest genus in the protea family is *Grevillea*, from Australia and the Malay

Archipelago. In fact, after *Acacia* and *Eucalyptus*, it is the largest genus of woody plants in Australia. Its name honors an eighteenth-century English patron of horticulture and botany, Charles Francis Greville, vice-president of the Royal Society of London. Included in the 250 species of *Grevillea* are evergreen trees and shrubs. Many of the numerous species are renowned for the ornamental qualities of their flowers and foliage; with few exceptions, all have horticultural potential. New, selected varieties and garden-raised, named hybrids are constantly being added to the long list of attractive plants in this genus.

The chief feature of *Grevillea* blossoms is the fringed effect created by the long styles, which protrude far above the general level of the flower cluster. The name spider flower, commonly given to members of the genus, refers to these showy clusters. Individual flowers are grouped together in several ways: they may be pendant or erect; some are borne in dense, cylindrical racemes or spikes, others, in a one-sided arrangement, like a toothbrush. Some flowers produce nectar that is attractive to birds.

Grevillea foliage is evergreen, shiny or silky-haired beneath, and variously dissected, lobed or needle-like. Common names for some favorites are especially descriptive: cat's claw, referring to the prominent style; prickly plume, in reference to both flowers and leaves; orange pine, with fiery orange cones of bloom and narrow, pine-like foliage.

G. robusta, silky oak, is popular in its native Australia and in warm climates around the world. This species is the largest of all grevilleas. Its silky wood and oak-like grain make it a valued timber tree; it furnishes excellent wood for cabinetwork. Silky oak is used as a shade tree on tea plantations to shield tea plants from the tropical heat. In Australia it is recommended for parks, large gardens and broad roads. *G. robusta* is particularly attractive as an avenue tree in California, Hawaii and Florida in the early summer months, when the branches are laden with orange-fringed blossoms. These one-sided, four-inch-long clusters of flowers, which accompany the much-divided ferny foliage, are followed by leathery black seed cases that persist after the winged seeds have been shed.

Although silky oak is a 100-foot tree in its native range, two- or three-foot seedlings have attained great popularity as indoor pot plants. The plant can be readily

grown from seed, and its feathery foliage is a pleasing addition to the indoor garden, even though flowering cannot be expected.

Banksia, a genus of trees and shrubs that are widely distributed in Australia, is distinctive in several ways. It is named for Sir Joseph Banks, the famous explorer-botanist who was responsible for many plant-hunting expeditions sent out from England in the eighteenth century. *Banksia* is considered symbolic of the Australian bush. Without exception, every species has horticultural potential. The diversity of leaf shape alone makes *Banksia* a popular subject for floral artists. All species are particularly attractive to honey eaters; hence its name Australian honeysuckle. Drops of nectar in the flowers attract both bees and birds in large numbers. The 50 species of small evergreen trees and shrubs in this genus are also a source of tannin and of wood for furniture, picture frames and shipbuilding.

Banksias are useful in the garden and are a good source of cut flowers. Their popularity derives from the variety of forms found in the flower spike, and from the bright red or yellow color. There may be as many as 1,000 individual flowers in one spike, and, as in other plants of the family, the style is long and conspicuous. The leaves of some species are smooth and shiny; others feel plush and have undersides that are pale or white with short, woolly hairs. Most species retain their winged seed, firmly embedded in woody cones; seed is extracted using special techniques. When a brush fire destroys the plant in the wild, the seeds are released, and subsequent germination is prolific.

B. grandis, commonly called tall banksia, is one of the largest species, reaching a height of about 40 feet. It has deeply indented, foot-long leaves, which are shiny above and woolly beneath. The yellowish-green inflorescence is also about one foot long. *B. meisneri* has leaves that closely resemble those of a fir tree. *B. speciosa*, the showy banksia, has narrow, eight- to ten-inch, grayish-colored leaves that resemble rickrack braid. Its thick, yellow flower cones attract honey-eating birds. The leaves of widely cultivated *B. media* are somewhat like oak leaves, and its flowers are bright yellow. *B. occidentalis* has bright red flowers. *B. integrifolia*, white honeysuckle, yields tannin from its processed bark. The wood of *B. serrata* is used for furniture. All of these species have spikes or cones that cut well and make interesting flower arrangements.

All four species of *Telopea*, a genus of evergreen shrubs from Australia and Tasmania, are ornamental, and have been brought into garden cultivation in Australia. They bear brilliant red flower heads of considerable size and are found in areas that are subject to periodic burning-over; at the base of the plant they develop a large, woody, fire-resistant excrescence, known as a lignotuber, from which the plant renews itself after burning.

T. speciosissima, commonly called waratah, is the state floral emblem of New South Wales. A mature, well-grown, eight-foot-tall plant may bear 400 globular flower heads in a season. The brilliant red flowers are packed in broad cones with red bracts. Its leaves are long, smooth and tapering, and toothed on the edges or lobed, with prominent veins. Waratah has been grown for many years in Australia; its blooms make excellent, long-lasting cut flowers. Waratah seeds are also commercially produced there.

Another Australian genus, *Hakea*, consists of about 100 species. The genus, whose members are commonly referred to as pin-cushion trees, was named in honor of Christian Ludwig von Hake, a German patron of botany of the early nineteenth century. The spidery, clustered flowers and woody seed pods of *Hakea*, unlike those of *Grevillea*, have seeds with long terminal wings. *Hakeas* are recommended in Australia for gardens, parks and massed highway plantings. They are grown outdoors in the southern and southwestern United States and are well adapted to Zone 10 portions of California. They withstand slight frost and are drought-resistant.

Embothrium coccineum, Chilean fire tree, is widely grown in Irish gardens. It is also found in the Puget Sound area of Washington and in coastal gardens of Oregon and California. Brilliant crimson flowers—thread-like because of the long, protruding styles—are massed in showy clusters on this hardy (U.S.D.A. Zone 9) and handsome plant from the Andes.

Leucodendron is a genus of small evergreen trees from Africa. These trees are dioecious; that is, male and female flowers are borne on separate plants. *L. argenteum*, the silver tree, is distinctive for its softly hairy, bright silver leaves that overlap each other closely and almost hide the thick branches. The silver tree grows outdoors in Zone 10 portions of California.

Also prominent among South African evergreens is the genus *Leucospermum*,

whose members are commonly called pin-cushion flowers. *Leucospermum* includes 40 species of erect or procumbent shrubs that bear globular, four-inch blooms with spiky red, pink, yellow or orange styles.

Serruria florida, blushing-bride, is a favorite flower for weddings and other festive occasions in South Africa. Nodding flower heads of creamy white flushed with pink are made up of papery, petal-like bracts surrounding a mass of pinkish hairs, which are actually the true flowers. These treasures from the Cape Province are almost extinct.

The plants of the protea family are incomparable in ornamental value. They are striking in habit and foliage, occasionally even approaching the bizarre. The uniquely fashioned, often intensely colorful flower heads are spectacular. Many species of the family—both Australian and African natives—are grown in arboreta and public parks in tropical and subtropical climes. In their native countries, they ornament many private gardens. Many have been introduced to warmer parts of the United States—primarily California, Florida and Hawaii, and to a lesser extent, Nevada, Arizona and Texas.

It has been said that members of this family are difficult and challenging to grow. Some are more tolerant of cultivation than others. In general, many do seem to resist cultivation outside their natural range and habitat, but cultural instructions are available for the persistent gardener.

The commercial production of many species specifically for cut flowers and foliage has developed in the United States, Australia, South Africa and Israel. In Australia, species of *Banksia*, *Telopea* and others are farmed for this purpose. A similar development has occurred in South Africa, where *Protea*, *Leucodendron* and *Leucospermum* are now grown on a commercial basis. Plantations of *Banksia* and *Dryandra* in Hawaii supply the cut flower market there; cut *Protea* flower heads also originate in the San Diego area and other parts of California. The nursery industry, too, is devoting special attention to these plants to meet an increasing market demand.

With the well-established economic importance of macadamia nuts, we can safely say that the protea family is in business!

—Jane Steffey

Jane Steffey serves as Editorial Advisor to *American Horticulturist* and is an active AHS volunteer.



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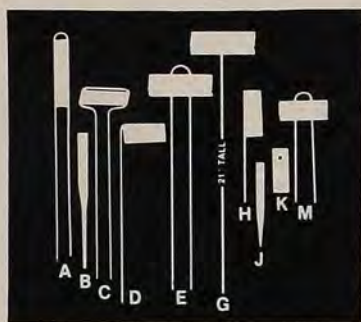
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BARNARD'S INN FARM

Continued from page 27

macrophylla 'Julian Hill', which bears 11-inch white flowers in June. When this tree was a small seedling, the walls protected it from the north and east winds. Under the oaks and on either side of the magnolia, I planted a seedling group of the Choptank River hybrids of the native coast azalea, *R. atlanticum*. These natives from our home state of Delaware are well adapted here, and mine have grown to over six feet tall. When the lilacs have finished blooming, these azaleas open their dainty pink and white blossoms and pour forth their fragrance. Once established, the azaleas never need watering, weeding, spraying or pruning, and the oak leaves that filter down keep them fed and mulched. The coast azalea is strongly stoloniferous; it spreads into a solid bed of bloom in less than 20 years from seed.

Inevitably, with nearly 2,000 taxa to accommodate, I found that my plantings had outgrown the arboretum field. Gradually, I spread out into the west field, the north field, the el field, and even into the woods at Holly Park.

One special planting can be seen along the west wall of the vegetable field. Twenty black tupelo, *Nyssa sylvatica*, were planted in a 100-foot row along the far side of the wall. These trees, which are known on the island as "beetlebung," have had all the low branches pruned off and now provide a high canopy over their wall. Walking along the path close beside the wall, looking under the trees, one can enjoy the view over the field to the distant woods beyond. The beetlebung make an informal hedge on stilts, creating welcome shade in summer and superb color in the fall.

Another special garden, dubbed the Playpen, is perhaps the biggest attraction for visitors. It is located at the south end of the five-acre west field, which is walled in on all four sides. Paralleling the south wall is a fenced area, 35 by 300 feet, with gate openings at either end and in the middle. The fence wire is supported by posts that are joined and topped by a well-weathered, flat board. Since the walls prevent both deer and rabbits from entering, it is safe to plant the broad-leaved evergreens and other selected plants that are vulnerable to the appetites of wildlife.

Full-sized conifers, planted outside the wall to the north, serve as a windbreak and provide a special atmosphere of shelter and seclusion. The wall, seen through the wire, also gives architectural dignity to the full length of this garden.

The plants in the Playpen—camellias, azaleas, compact rhododendrons, dwarf conifers, spring species bulbs, choice hollies and many plants of different textures and times of bloom—are all kept to scale. Some perennials, such as columbine, gentian, *Shortia* and lilies, as well as flowering shrubs, including *Daphne* and laurel, enhance the wide borders on either side of a central grass path. *Clematis* vines climb on the wire. At the far west end, just outside the Playpen, is a long stone seat at the edge of the woods. One can sit there and, when the Playpen gates are open, see the wide grassy path that leads through the Playpen, the arboretum field and the nursery field all the way to the wall along our highway and over to the neighbor's field beyond.

Near the buildings the grass is mowed occasionally, suggesting a lawn. However, the centers of the largest fields, left rough and mowed only once a year, are filled with wildflowers and grasses from spring until fall. The wildflowers include brown-eyed Susans, Queen-Ann's lace, naturalized Siberian iris, goldenrod, green-fringed orchids (*Platanthera lacera*), ladies'-tresses (*Spiranthes*), Quaker-ladies (*Hedysotis*), pussy-toes (*Antennaria*) and the endless supply of asters and other New England treasures. I have also added butterfly weed, colicroot (*Aletris*) and other natives to these fields from time to time. The walls embrace all these lovely wildflowers and seem to hold back the encroaching forest.

From our terrace off the transformed cow barn, we see two sides of our el field wall. These are decorated with clematis and daylilies during June, July, August and early September. Beyond the field wall, we can see the open area of the big west field. This wide vista terminates in the quiet gray-green woods bordered by a strong horizontal line of granite close to the earth, giving a restful feeling of permanence. Throughout the seasons, there is harmony between plants and walls. In winter the tones are gray: the rocks are white and gray, or black and gray, or greenish with lichens; the grass is yellowish-tan or pinkish-tan against gray rocks. In summer there is a preponderance of green—rich, mixed shades—studded with the colors of summer's flowers. In earliest spring, fragile pinks, tan, chartreuse and white light up the gray.

Apart from the colors, one is struck by the forms of the individual boulders making up the walls. There is an unchanging, timeless quality to their shapes. They have unyielding surfaces and an unstructured

mass—no tops, bottoms, fronts or backs. They are entirely impersonal. The plants, on the other hand, are always changing, uncertain, fragile and vulnerable. A plant will either grow or die, while a rock always keeps the same size and shape. The diversity of patterns created by the wall-builders is basically the same today as it was 100 or 200 years ago.

I sought the most elegant plant textures and forms to contrast with my walls. Epi-mediums, maidenhair fern, *Vacouveria*. . . All of these low, wild treasures look lovely against a giant basal boulder. On a taller scale, the bright holly berries of the deciduous winterberry—dainty and erect—are at their best in the sunlight, planted against a wall. In August, the sweet autumn clematis vines tumble over both sides of many walls in sheets of white fragrance. Late in the autumn our native woodbine, *Parthenocissus quinquefolia*, drapes its crimson-leaved strands along the walls and reaches high into the branches of the black locust, *Robinia pseudoacacia*.

Some of the walls on Barnard's Inn Farm can present a formal, dignified aspect, such as those on our frontage on the State Road. When the grass strip between the blacktop and the wall is mowed, and the entire wall can be seen, passers-by often look over it to see what is hidden behind the noble granite structure. The pine trees look very soft near the heavy wall, and the dwarf conifers look so sophisticated and elegant when contrasted with the walls.

I have made paths that are as basic to the garden's design as the walls. Many paths lead to openings in the walls and to new areas of interest. Some walls and paths are inseparable. When going in the same direction, one supports and reinforces the importance of the other. It is more inviting to follow a path to its destination with a wall at one's side. If a path leads to a wall at a distance, a vista is created. For example, at Barnard's Inn Farm a long path through conifers and rhododendrons leads to a large winterhazel bush in front of a wall. The wall is in view the length of the walk, but in early spring the delicate yellow-green tassels of the winterhazel adorn the gray wall, which can be seen through the bare branches of the tall shrub. More spectacular in bloom is the allée of kousa dogwood, *Cornus kousa*. The double row of trees progresses through three fields and terminates at a boundary wall. At the end of this allée are three massive granite rocks, the most aesthetic of our old, discarded rock pile. They are grouped together and

backed by American hollies, which are in turn backed by a wall.

The walls also create partitions between different scenes. Around the far end of the vegetable field, for example, the path beyond the *Stewartia* forest leads through a wall's opening into the arboretum field. Quite unexpected is the sheltered stone garden, slightly raised above the grass and tucked into a quiet corner of the wall beside a swinging bench that is supported on old granite posts. One is invited to stop, rest and look at the minutiae of horticulture—a collection of small rock plants. In another field a camellia border runs for 150 feet on the north side of an east-west wall, which protects the plants from the hot March sun. It gives one such a satisfying feeling to see the glossy, sunlit evergreen leaf against the rough-surfaced, immobile stone wall. Camellias, of course, are experimental here, but much has already been learned, and many new seedlings have proved viable in our latitude.

The animals that abound on the island have developed their own special uses for the walls. Frightened rabbits leap to safety through their well-known holes between the rocks; rabbit-size holes are not big enough for dogs. Deer approach the walls cautiously, stop still, then spring effortlessly to the other side. Mice and voles, in their twilight travels, have made runways over the rocks—not over the top of the walls but along their sides, in well-traveled routes. Skunks will lumber along the length of a wall for 50 feet, until they find an easy passage and escape out of sight on the far side. Quail, perched on the top of the wall, sing their cheery territorial call, "bob-white." They can be coaxed by an echoing whistle to run along the top for 30 or 40 feet. Cats go up and over the walls in a kind of slither when on the prowl through the fields.

So, the walls offer more than a shelter from the wind; they become a textural setting for the contrasting forms of plants, a home for wildlife, the structure of my garden's design. Quite simply, there never would have been an arboretum at Barnard's Inn Farm had we not been blessed with our granite walls. ☼

Polly Hill is an amateur gardener and has been a member of the American Horticultural Society for many years. She is grateful to Longwood Gardens, the University of Delaware and many gardens and plant societies for teaching her much of what she knows about horticulture and for helping with plantings at Barnard's Inn Farm.

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Garden Gates

You'd think that garden gates, especially in the country, would be fairly common, wouldn't you? In the small New England town where I live, I thought that with little effort I would find attractive wooden gates, their white paint peeling, or even the remnants of filigreed wrought iron, rusty and made immobile by spider webs and a tangle of wild roses.

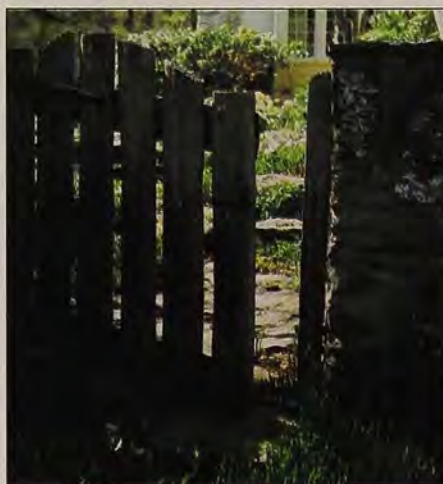
Yet on a recent survey of the countryside, I was bewildered to find, instead of gates, a disproportionate number of soulless gaps—gaps in everything from listing picket fences to formidable stone walls, their hand-forged hinges rusty and useless.

As the afternoon wore on, I began to think that the opening and closing of garden gates had indeed become a lost art. But high on a hill with a view of the surrounding valleys, I looked again at a field-stone wall I had driven past a hundred times before, and noticed a gate set into the wall.

Once a crisp green, the gate was now faded to the color of the lichen on the stones, and opened with the creaks and groans of old age. Here was a gate that had welcomed generations of families from the orchard of apple trees and wildflowers beyond, into the formality of the enclosed herb garden.

This hillside setting suggests that a garden's interest frequently depends upon changes of mood and style, as well as adroit transitions between informal and formal areas. In this case, we are led from the meadow's dappled shade, through the green gate into the sunny, geometrical confines of the walled herb garden and out through a wrought iron gate to a lawn edged with perennial borders. While the gates of this country garden were never designed to keep rabbits from devouring the herb garden's sorrel, they are extremely helpful in establishing fluid transitions between three distinct areas of the garden.

The green gate's pleasant rusticity is totally in keeping with the mood of the orchard as one walks from the meadow. From inside the walled garden, this same gate prepares one for the orchard. On the walled garden's south side, the fanciful wrought



Garden gates come in all shapes and sizes. As all four of these garden gates suggest, a gate can set the mood for a garden even before the visitor enters.

iron gate sets the mood for the more formalized tone of the lawn and borders. From the lawn, this same gate appears to fit well with the herb garden's own style of formality.

Unlike a door set in a wall, gates have the obvious advantage of letting you glimpse what is to come, thus establishing a visual link between one garden area and the next. Then, too, there is a moment just before you pass through the gate—when you look over it to the orchard billowing with white bedstraw, *Galium boreale*, and goldenrod, *Solidago nemoralis*, and, turning back to fasten the latch, catch a glimpse of the herb garden's golden *Hemerocallis*. Repetitive colors aside, this simple act of turning back establishes an even firmer link between these disparate areas.

When a garden is laid out, all too often there is so much concern for what goes into it that little attention is given to how and where it begins, or how to heighten the initial and final experiences. The act of entering a garden—whether through a weathered cedar gate or lilac hedge, or around the shade of a massive beech tree—becomes a dramatic metaphor. Here, we are told, is a separate place—a place where solitude, peace and beauty can be found; a timeless place where one's spirit is renewed.

One gardening friend, enamored with the poetic imagery of gates, has playfully extended this garden gate metaphor. For her, gates are synonymous with a childhood of gate-swinging and fences made invisible beneath honeysuckle. Following what she described as a "lively debate" with her husband, she removed a single hinge of the gate in the fence surrounding their front yard and left the gate hanging "in a most picturesque manner." Over the years, this perpetually open gate, enmeshed in honeysuckle and morning-glories, has become an unchanging reminder of childhood and a symbol to friends of this couple's constant and overflowing hospitality. ☼

—Margaret Hensel

Margaret Hensel is a landscape designer and writer living in Massachusetts.





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