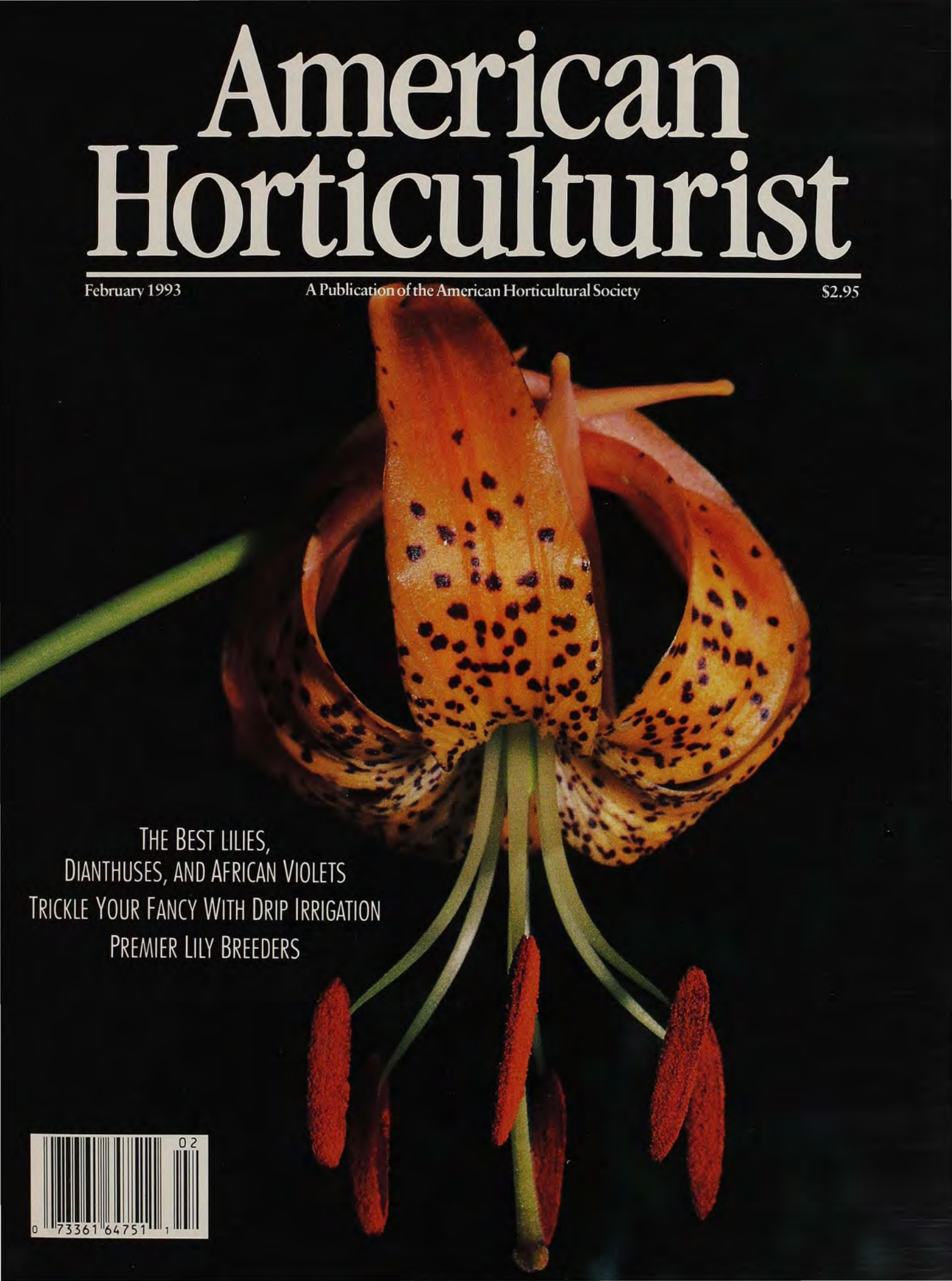


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February 1993

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# American Horticulturist

Volume 72, Number 2

February 1993

## ARTICLES

### Proven Performers

In our popular annual feature, three national plant societies name some (nearly) fail-safe favorites.

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#### African Violets

by *Carol Bruce* ..... 17

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From the exquisite but fussy species, lily-breeding pioneers have produced tough-as-nails hybrids for gardeners and florists.

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### A Defense of Ailanthus

by *Richard S. Peigler* ..... 38

It may be the stinking ash to some, but in a city lot bereft of other greenery, it earns the name tree-of-heaven.

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### FEBRUARY'S COVER

Photographed by *Priscilla Eastman*

The three-foot-tall Vollmer's tiger lily, *Lilium vollmeri*, grows in hillside bogs in two counties in southwest Oregon and adjacent areas of California. It is threatened by collecting throughout its range, according to Donald C. Eastman's *Rare and Endangered Plants of Oregon*. Of ninety lily species native to the Northern hemisphere, only twenty-two have been tapped by breeders for garden and cut-flower hybrids. The Nature Conservancy reports that at least seven are candidates for federal listing as endangered. For more on endangered lilies, see page 28.

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# COMMENTARY

Creating a fertile ground of horticultural understanding is essential to a positive, progressive future, not only for our organization, but also for our nation. Therefore, the Society staff focuses much of its work on promoting gardening to children and young adults. Nevertheless, our current membership of dedicated gardeners and horticulturists is our germplasm, our life blood. I will devote the next few commentaries to your concerns. I hope you take some time to respond.

We begin with the definition of horticulture as an art and the need both to evaluate and to teach it as an art form. Webster traces "art" back to the Latin noun "skill" and the Greek verb "fit" and defines art as "skill in performance acquired by experience, study, or observation." Note its similarity to the definition of science: "knowledge attained through study or practice." Horticulture fares beautifully in Webster: "the science and art of growing fruits, vegetables, flowers, and ornamental plants." Note the emphasis on both art and science. The Society will focus its resources on these two areas in the next three years. We will promote and develop professional and amateur education and will concentrate in our publications, lectures, and symposia on the art, design, and philosophy of horticulture.

Of the contemporary arts, sculpture is most like gardening. It is subjective and physically demanding. A great sculpture inspires and then moves the spirit; it is a wellspring of emotion and energy. A great garden performs the same function. The ultimate expression of the art of gardening is the Japanese garden. Several thousand years have resulted in the suggestion of a universe within a small space. Western gardens may be more expressive of a particular philosophy of life or of the power and mystery of the natural world, but no western garden expresses so directly the relationship between human nature and the greater universe as does a Japanese garden. We burden our gardens with outmoded philosophies and "meaning." The Japanese free their gardens of meaning, allowing the spirit of human nature to mingle with the *genius loci*—the spirit of the place.

A recent lecturer at River Farm, Klaus Jurgen-Evert, spoke to us of the new greenbelt recently completed in Stuttgart, Germany. He showed slides of impressive new garden displays by American designers Michael Singer and Dan Graham that break from patterns of tradition and reach beyond European models. Their gardens demand an experience of nature and plants unencumbered by conceptual baggage such as mankind's domination of nature. These innovations are a good sign for the western horticultural tradition. We hope that eastern-inspired creativity continues to liberate our gardens, enabling them to evolve in a greater and more universal context. Only in this way will horticulture become an important part of people's lives.

—George C. Ball Jr., AHS President





# LETTERS

## Hope for Fruit

In regard to Chris Bright's lamentations on plastic-enshrouded fruit and the shy selection at his local market ("Offshoots," October): the apples of the past may be forgotten but they are not gone! Apple and pear trees can survive for a century or more and far-sighted individuals have either preserved or rediscovered many of our heirloom cultivars. Amateur fruit enthusiasts have associated into networks such as the North American Fruit Explorers, the Home Orchard Society, the Seed Savers Exchange, and others. Their members have developed extensive collections of heirloom and modern fruit varieties.

Fruit cultivars old and new, wild and cultivated, beautiful, gruesome, delicious, and unspeakably dreadful tasting are safe at our National Germplasm Repositories operated by the U.S. Department of Agriculture's Agricultural Research Service and are waiting for plant breeders and daring growers to discover or rediscover their hidden virtues. The repository for apples in Geneva, New York, has about 2,000 apple cultivars. At our repository in Corvallis, Oregon, we have collected nearly 2,000 types of pears, including about 800 named edible cultivars. We are maintaining about 300 kinds of hazelnuts, 700 strawberries, 600 raspberries and blackberries, 400 blue-

berries and cranberries, and 400 currants and gooseberries. We also have smaller collections of "minor" fruit genera such as elderberry, serviceberry, quince, and medlar. —Joseph Postman, Plant Pathologist  
National Clonal Germplasm Repository  
Corvallis, Oregon

*Included in Joseph Postman's letter were the addresses of the fruit organizations he mentions: Home Orchard Society, P.O. Box 776, Clackamas, OR 97015; North American Fruit Explorers, Route 1, Box 94, Chapin, IL 62628; and Seed Savers Exchange, Rural Route 3, Box 239, Decorah, IA 52101.*

## We Killed the "Jr."

In her interesting article on the White House landscape (October), Barbara McEwan seems to say that Frederick Law Olmsted made a master design for the White House landscape in the time of Franklin Roosevelt. The Frederick Law Olmsted I know of died in 1903.

The reason I spotted this is because I only recently learned that Central Park (which seems so modern) was already under way at the time of the Civil War (which seems so long ago).

—Rachel Foster  
Eugene, Oregon

*You're right. It was Frederick Law Olmsted Jr. who drew the plans for FDR. Ms. McEwan is innocent; it was an editing error.*

## Three "Sycamores"

The excerpt "Solace for a President" from Barbara McEwan's *White House Landscapes* makes an excellent case for the therapeutic value of gardening, a concept I strongly support. This letter, however, is prompted by its mention that among trees planted by John Quincy Adams was the "sycamore maple, which he called button-wood."

During travels in western Europe and Israel, I became aware that the common name, sycamore, is applied to trees of three separate genera on as many continents.

The original sycamore appears to be

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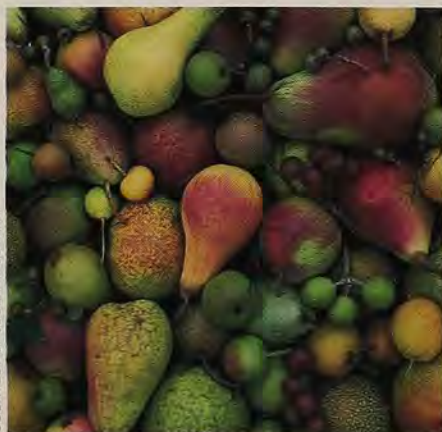
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*The Pyrus genus ranges from the tiny pea-pears of China to the large edible European and Asian cultivars.*

COURTESY OF JOSEPH POSTMAN

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Texas State Horticultural Society  
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Tustin Garden Club  
Santa Ana, California

*Ficus sycomorus*, the Biblical sycamore from whose branches Zacchaeus of Jericho watched the passage of Jesus. A native of Africa, it became naturalized in Egypt and Palestine. It is a member of the fig family, Moraceae, and was given its species name because its oval leaf resembles that of the mulberry, of the genus *Morus*. It is a massive, broadly branched tree growing up to eighty feet tall.

Native to central and southern Europe is that continent's largest maple, *Acer pseudoplatanus*. During the crusades of the twelfth and thirteenth centuries, European churches produced miracle plays in which a favorite scene depicted the flight of Joseph and Mary into Egypt. Legend says they rested on their journey under a sycamore tree. Since no *Ficus sycomorus* grew where the plays were performed, this maple was chosen as a substitute, and gradually "sycamore maple," or simply "sycamore," became its common name. Introduced into England in the 1500s, it is dome shaped with large, five-lobed leaves and grows approximately 100 feet tall.

A few centuries later, when western Europeans began penetrating the wilderness beyond the mid-Atlantic coast of the North American continent, they came upon trees whose size, general shape, leaf outline, and peeling bark at least superficially resembled the familiar sycamore maple of Europe. The American "sycamore," however, is *Platanus occidentalis*, probably a descendant of one of the first hardwoods to grow on earth, originating from the Cretaceous and Tertiary forests of Greenland and arctic America.

One of the more appropriate common names that developed for *P. occidentalis* is "buttonwood" or "buttonball," because of the tree's one-inch spherical seed ball. Here in southeastern Pennsylvania buttonwood seems to be used about equally with sycamore as a common name for this species. Adams's use of buttonwood as a common name for the sycamore maple, which has a very characteristic maple seed, was not appropriate. But perhaps this small confusion in such a tangled taxonomy can be forgiven even on the part of a former president.

—Betty Cleland Cherry  
Lancaster, Pennsylvania

### Redwood Miracle

I am a newcomer to *American Horticulturist* and I found Susan Sand's story about the dawn redwood (October) alone worth the price of membership in the AHS.

It seems remarkable that in the midst of a bitter war there were scientists in China persisting in their research on forestry. It is also striking that a Chinese biologist was

able to obtain the scholarly work of a Japanese paleobotanist at a time when China and Japan were at war with each other. And then seed was collected and distributed before China closed itself for decades. It rather sounds like a miracle.

Susan Sand has written an inspiring story that makes me just slightly more optimistic about current efforts to identify new species in the face of habitat destruction.

—Mary Yee  
Silver Spring, Maryland

### More Barbs

I wonder why *Castor-alalia* (*Kalopanax pictus*) failed to make the "pain and terror" list in your August issue?

Although I've never seen a mature specimen, the daunting spines on the small one coming along in my garden suggest to me that it has a brilliant future as a barrier plant.

—Peggy Rea  
Sewickley, Pennsylvania

*Young stems of the Castor-alalia are armed with stout prickles. But since the tree can grow to forty or sixty feet, your plant may lose its value as a defense, except perhaps against second-story burglars.*

### Reference Overlooked

In Elisabeth Sheldon's review of Christopher Woods's *Encyclopedia of Perennials* (October), she overlooked the most comprehensive of them all: *Hardy Herbaceous Perennials* (1990) by Leo Jelitto and Wilhelm Schacht. It covers over 4,200 species and 3,600 cultivars. It is available from Timber Press.

—Robert B. Conklin, Publisher  
Portland, Oregon

*Jelitto and Schacht are German and their reference book was first published in that language. Sheldon's review was a comparison of American perennial encyclopedias for American gardeners (although she observes that some of those authors are British imports to our shores). She does not have the Jelitto/Schacht set, she says, but "having been urged by my friends, I've been meaning to order it." The American Horticultural Society's Gardeners' Information Service makes extensive use of it in answering member questions about perennials, primarily because it does contain information on such an exhaustive number of plants. This is a good time to note that the AHS Book Program offers many books that are never reviewed in our pages. Hardy Herbaceous Perennials was listed in the book catalog in the September News Edition. Members can purchase the \$125 book for \$105.95 plus \$8 for shipping and handling. Use the coupon on page 11.*

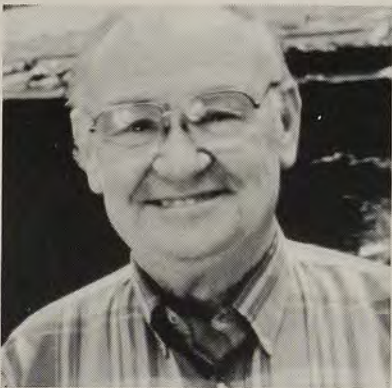
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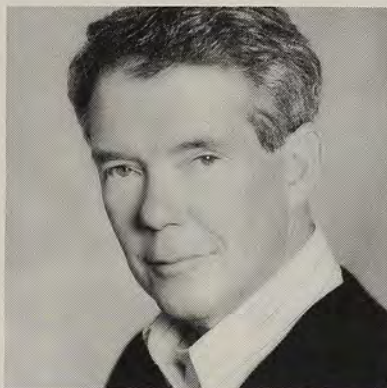
*Katy Moss Warner, General Manager of Horticulture at Walt Disney World and AHS board member discusses the visual appeal of color.*



*Victory Garden Host Roger Swain offers "An Ear to the Ground: Listening to the Heartbeat of a Garden."*



*Robert Marvin, a South Carolina landscape architect, will speak on the visual elements of garden design.*



*Rayford Reddell, owner of Garden Valley Ranch in Petaluma, Calif., presents "Fragrance — Whose Nose Knows?"*

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## OFFSHOOTS



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### Help

By Elisabeth Sheldon

Overwhelmed as we all are these days by statistics on increased crime, pollution, and the general deterioration of the planet and other people's morals, we take great pleasure in learning of the growth of worthy, as opposed to unworthy, activities. News of the surge in flower gardening all over the United States must cheer those who have deplored the attitude of most of their fellow middle-class citizens who have for long confined their gardening activities, if any, to mowing the lawn and perhaps to "landscaping" their properties, *i.e.*, getting some landscaping firm to install foundation plantings in the form of Japanese yews and possibly, to plant, somewhere on the lawn, a clump birch, a dwarf red maple, and/or a pink dogwood.

It is important that these newcomers to proper gardening be given the help and encouragement they need. Perhaps following the law of supply and demand, numberless articles and new books on gardening

are being printed. The latter generally fall into two categories—either they are great glossy books containing heart-breakingly beautiful pictures of established gardens (usually in England) or they are business-like how-to books full of diagrams, charts, and figures. Books in the first category inspire those of us who, although we have not inherited stately mansions, a team of gardeners, and a gentle climate, cheerfully settle for less. We study the pictures and texts, culling ideas from the experts, using what we can in some small way.

But it is the books and articles in the second category that I want to discuss here. Some of them are extremely helpful to beginning gardeners, giving sensible, simple information about soil preparation, garden design, maintenance—all the basic stuff. Others, I fear, may be losing new recruits either by making gardening sound too easy or too difficult. One writer tells them it's a breeze, while another terrifies them with large amounts of scientific information and complicated requirements.

One of the former will say that a "cottage garden" is an easy solution to all their garden problems. For this, they must take



up their sod, till in sand and organic matter, install tough perennials, mulch with chipped pine bark, and relax. No more hard work. Now, in the first place, "taking up the sod" is an enormous job. Furthermore, with the sod goes much of the best topsoil. Perhaps the novice should be told that the old-fashioned way of preparing the soil for a flower garden is to spade or mattock it up, removing the weeds, roots and all, then incorporating organic matter in the form of compost or old manure. (Grit can be added if the soil is very heavy.) The modern method is usually to herbicide the area, wait a few weeks, then till it, working in the soil amenders.

The writer then tells you that, having "prepared" the soil, having planted the tough perennials (rudbeckia, sedum, grasses, etc.), having surrounded them with a thick layer of wood chips, you're all set for the rest of your life, as if plants weren't living things. Of course you'll have to lift, divide, cut back, and nourish them. There are low-maintenance but no no-maintenance gardens, as anyone who has tried to make one knows.

Then there's the writer who recommends planting a "meadow," surely the most difficult gardening project of all. Even if the area is made free of weeds and tilled before planting, the weed seeds already in the soil and those that will be deposited by birds and the wind will produce tough, unattractive immigrant weeds capable of triumphing over most desirable native wildflowers, which generally make up their own minds about where they want to live. Cornell University did a study on meadow gardens and found that even when the previously prepared meadow was weeded for two years after planting the wildflower seed, very few wildflowers remained for long.

It is regrettable but understandable that vendors of seeds and plants would want to make meadow gardening or any other gardening sound easy, but what many people don't realize is that many magazine editors want to do the same thing in order to please the seed and plant vendors who will be buying advertising space in their publications. Their writers must accentuate the positive and all but eliminate the negative.

I think that most of the writers who err in the other direction are authors of books. You have to say a lot to fill a book. I remember becoming quite irritated by books on raising animals that my daughter used to read when she was young. They told her that her horse had to have a wooden stable floor and expensive equipment, food, and medicine. Her dog had to have a special diet, regular visits to the veterinarian, and a battery of pills admin-

istered at regular intervals. I realized (but she did not) that the experts who wrote those books were describing what would be optimum conditions for the horse and dog, but that the animals didn't necessarily require 100 percent perfection in their care and nourishment in order to thrive—any more than people or plants do.

One writer tells me that "bulbs need a neutral well-drained soil with a high phosphorus content and these nutrients should be at their root zone or just below it." If I took him seriously I would never put a bulb in the ground. In the first place, how could I ascertain that the soil was neutral without having a sample tested from each area where I planned to plant bulbs? No doubt, in order to get the largest, happiest tulips, the author's instructions should be followed, but perfectly lovely tulips, daffodils, squills, and other flowers can be had by simply chucking the bulbs down into what appears to be reasonable garden soil. A child can—and often does—do it without testing the soil or adding phosphorus.

There's a big book on color in the garden that might persuade you that you don't dare put two plants together in your border without first checking the position of their colors on the color wheel.

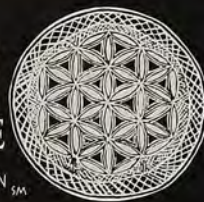
I've talked to novices whose self-confidence has been all but destroyed by taking such material too seriously. They are afraid they've designed their gardens badly, have chosen the wrong plants, and have put them in the wrong places. They fear their color combinations are crude. When a plant dies they feel guilty, instead of feeling cross with the plant, as we old-timers do. What is this? Gardening is supposed to be fun.

We should certainly read constantly and search for information on the plants we are trying to raise—find out their place of origin, their preferences as to soil, light, temperature, moisture—then do our best to accommodate them. We should have our soil tested, too, if it appears to be lacking in nutrients or to be inhospitable to the plants we're trying to grow. But since there are so many variables and inexplicables in gardening, it's sometimes hard to say what went wrong—or right. It's well-known that it's possible for a plant to grow for someone and not for the person next door, even when the environment and treatment seem to be the same. We can but do our best and not grieve too much over our losses. I did that for a long time. Then my husband cured me of it with an old saying: "You can't win 'em all."

*Elisabeth Sheldon is the author of A Proper Garden and a frequent contributor to American Horticulturist.*

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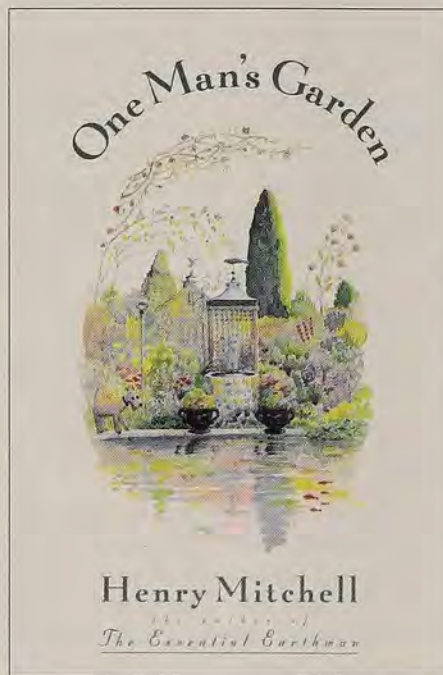
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## BOOK REVIEWS



### One Man's Garden

Henry Mitchell. Houghton Mifflin, Boston, 1992. 262 pages. 6¼" × 9½". Black-and-white illustrations. Publisher's price, hardcover: \$21.95. AHS member price: \$19.75.

American garden writing has been coming into its own the last few years. There is still plenty of antiseptic prose, slavish anglophilia, plant one-upmanship, and accounts that suggest more research on the part of the writer than actual garden time logged. However, more authors are willing to venture opinion, and these opinions are based increasingly on experience. In the forefront is Henry Mitchell.

Don't look for wimpy writing from Mitchell. *One Man's Garden*, his latest collection of columns from the *Washington Post*, is a refreshing pastiche of thoughts that are practical, yet often with a broader stroke of garden philosophy. Mitchell's style is breezy, even gale force at times, but he is a keen and enthusiastic observer who has cast off most of the pernicious abstractions of the gardening art. He is brutally

honest about his own garden experience and funny as well. A little self-deprecation is a welcome trait in a field where many take themselves too seriously.

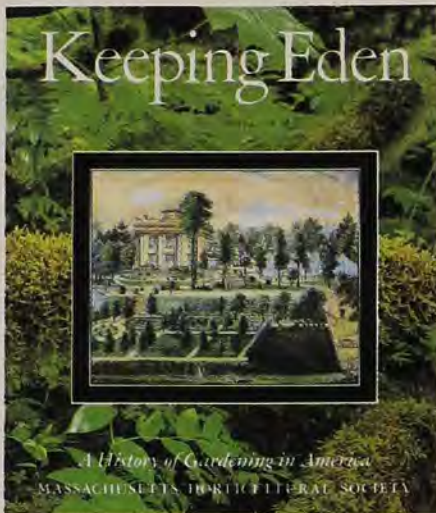
*One Man's Garden* deserves a place on the bedside table and should be read an entry or two at a time before drifting off to the dream world. But watch out. The book has so many good ideas the reader may not go to sleep until the 1 a.m. news.

Mitchell understands that gardeners live by dreams, but he has also grown plants in small places long enough to suggest that we not try to emulate large gardens by simply miniaturizing them. Enjoyment and keeping fresh our sense of wonder, these are the important things. We cannot grow everything, so why try? There are plenty of good plants that we both like and can grow. However, the garden will change with time, partly because we are dealing with living things. Also, interests change, and we become bored with certain plants. As Mitchell points out, the longest bloomer may become too familiar. Concentrate on favorites and give them good backdrops, including hedges or shrub rows. Otherwise, everything becomes a jumble.

Mitchell has a fine sense of description. The single-flowered kerria is a "golden nickel," the double-flowered one a "shaggy yellow carnation." The cherries are "powderpuffing" Washington, D.C., in April. Occasionally the reader can detect a southern accent on the page, as about a color clash, "The flaming canary begins to sing with the scrambled eggs." Beatrix Farrand and Thomas Jefferson come in for gentle lumps, as does the Yankee so-called common name for *Magnolia grandiflora*.

For me, one Mitchell aphorism will linger. "It is not important for a garden to be beautiful. It is extremely important for the gardener to think it a fair substitute for Eden."  
—Frederick McGourty

*Frederick McGourty and his wife own Hillside Gardens in Norfolk, Connecticut, a nursery specializing in uncommon perennials. He is the author of The Perennial Gardener.*



**Keeping Eden: A History of Gardening in America**

*Edited by Walter T. Punch for the Massachusetts Horticultural Society, Bulfinch Press/Little, Brown and Company, Boston, 1992. 277 pages. 9 1/4" x 11 1/4". Color and black-and-white photographs and illustrations. Publisher's price, hardcover: \$50. AHS member price: \$45.*

Beautiful and wide-ranging, this book of essays on American garden history has earned a place on my short list of essential books for beginners. I believe garden history professionals will enjoy and learn from it as well.

The book opens strongly with a refreshing essay by Gordon De Wolf on "The Beginnings" of gardening in America. Focusing on utilitarian plants and practices, De Wolf gives unusual attention—and respect—to Native American gardeners.

The next four essays move more or less chronologically forward, ending with very recent times. Unfortunately the set is repetitive and lacks rigor. One bright spot is the insightful piece by William Howard Adams on twentieth-century gardens. Essays on gardens in the South and the West follow.

The second half of the book includes an excitingly wide array of garden history topics. Mac Griswold explores what American art reveals of gardens, Tamara Plakins Thornton writes a social history of Victorian gardening and morality that is anything but dull, and Keith Crotz offers tidbits on the history of garden technology. The first gas-powered lawn mower, for example, was created in (where else?) Detroit in 1902 by a man who was both (think about it) an industrialist and real estate developer.

Other engaging chapters in this section include Monticello's Peggy Cornett Newcomb on "Plants of American Gardens," Tovah Martin of Logee's Greenhouses on "Gardening Under Glass," and the late

Elisabeth Woodburn on "American Horticultural Books."

At her death in 1990, Woodburn was the leading expert on American garden books and this points up one of the strengths of *Keeping Eden*: editor Walter Punch assembled a stellar group of authorities. The results are best when the authors were allowed to follow their passions, often reprising a topic they had already explored in a full-length book.

The illustrations are another strong point. Bulfinch Press is the illustrated-book imprint of Little, Brown and Company and its expertise shows. Eighty-one black-and-white and 114 color photographs, plans, and line drawings, most taken from period sources, are printed on heavy, glossy paper with fine results. The bibliographies at the end of every essay, totaling hundreds of citations, are also excellent.

Editor Punch writes that he hopes *Keeping Eden* will serve as a "catalyst and invitation." Diverse, authoritative, well-illustrated, and entertaining, it should certainly play that role for a wide range of readers.

—Scott G. Kunst

*Scott G. Kunst is a landscape historian and preservation planner in Ann Arbor, Michigan.*

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# Dianthus

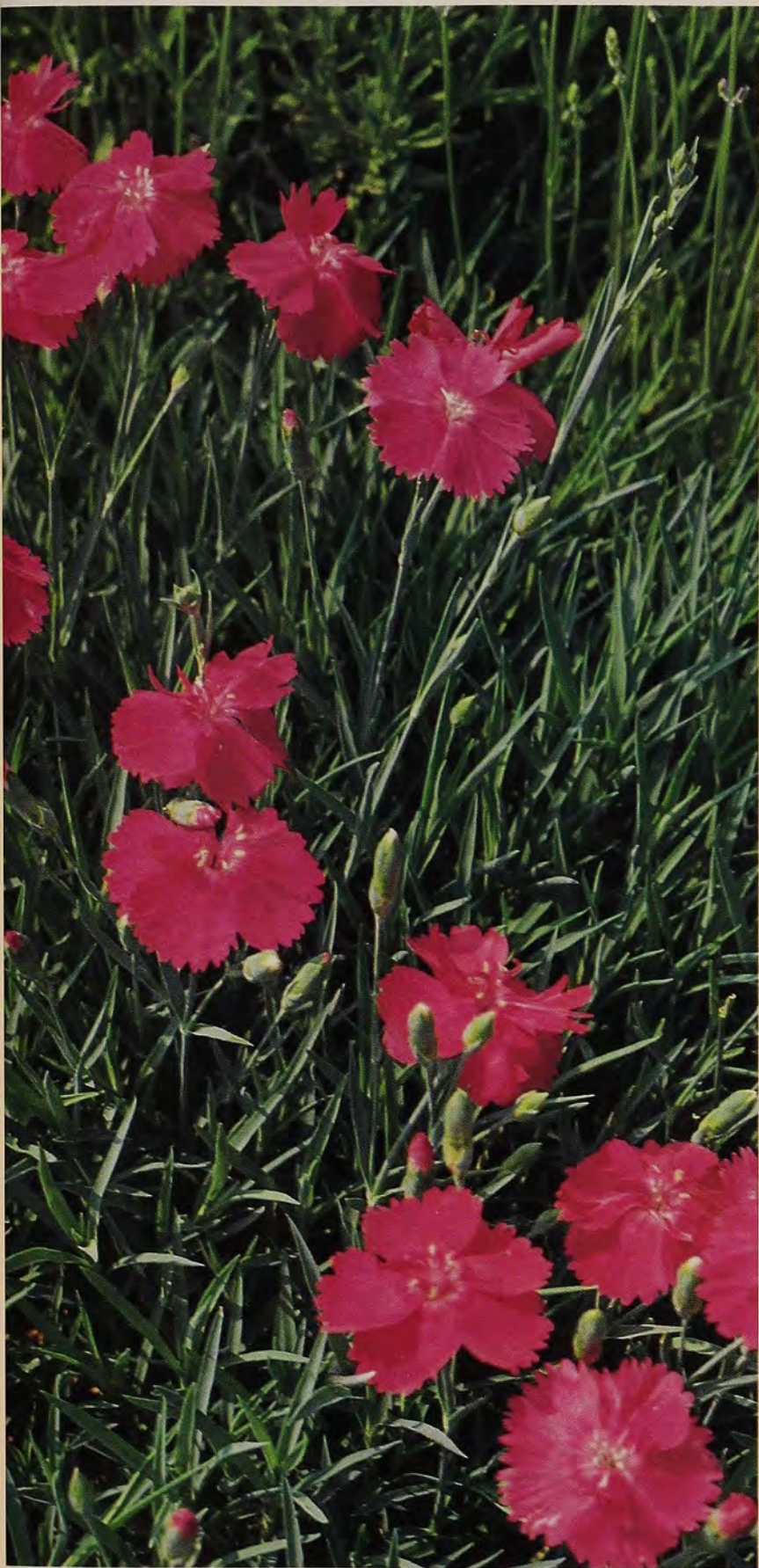
B Y R A N D B . L E E

THE ORDER CARYOPHYLLACEAE includes such garden stalwarts as the campions and soapworts. It also contains the genus *Dianthus*, encompassing nearly eighty annual, hardy perennial, and biennial species ranging in height from less than an inch to several feet. Most are native to the alpine meadows, woodlands, and forests of the northern temperate zones. Best known are the feathered pink, *D. plumarius*, with its romantic English cottage garden associations, and the carnation, *D. caryophyllus*, but centuries of dianthus breeding have resulted in a bewildering number of selections and interspecies cultivars.

The genus was named *dianthus* ("divine flower") by Linnaeus, the eighteenth-century Swedish naturalist who developed the binomial system for naming plants. Medieval perfumers and confectioners prized dianthus for their spicy fragrances, but many species also boast spiky



DICK KEEN



blue-green foliage that is wonderfully cooling to perennial or mixed borders—even those that are somewhat dry—long after their flowers have blown.

Dianthus breeding has been a minor mania in England and on the Continent since Tudor times. The American Dianthus Society was founded in 1991 to promote the cultivation of *Dianthus* species and hybrids in the North American home garden and to lobby for increased attention to the genus among North American plant breeders, nursery folk, landscapers, and garden designers.

In a recent poll, undertaken for *American Horticulturist*, our members named the following varieties, many antique, as particularly reliable garden performers, but the list is by no means exhaustive.

#### ***Hardy Perennial Garden Pinks***

Most of the following generally will overwinter with some protection to Zone 5 and are best suited for the informal garden, being prolific of bloom but lax of habit.

*D. superbis*, the superb pink, grows about one and a half feet tall. In June and July, from a base of narrow, soft green foliage, it produces long stems topped with very loose clusters of the most ethereal flowers imaginable: five threadlike white or palest lilac petals, so deeply fringed that they have virtually no center. They will usually keep reappearing until frost. A hybrid of *D. superbis*, *D.* × ‘Rainbow Loveliness Strain’, bears larger flowers in richer colors over a longer period; it was bred by England’s Allwood Brothers Nursery, which has brought numerous treasures into the dianthus world. Both breathe an exquisite fragrance, soft but powerful, not at all clovelike but pervasive and watery like poet’s jasmine, with a slight, elusive, buttery underscent.

*D. plumarius* ‘Rose de Mai’, introduced about 1820, forms ten-inch-high drifts of spiky gray green and armloads of fringed pale pink or creamy mauve semidouble flowers with a delicious fragrance. From the 1840s comes the neglect-tolerant *D.*

*The cheddar pink, like many dianthuses, is highly fragrant.*

*plumarius* 'Lady Granville' (often misnamed 'Lady Glanville', 'Lady Grenville', or 'Lady Glenville'), which bears atop ten-inch blue-green foliage very fragrant double white flowers with burgundy tips and eye.

*D. plumarius* 'Aqua' is almost certainly the American name for one of the most famous English pinks, *D. plumarius* 'Mrs. Sinkins', introduced into commerce about 1868 by the same grower responsible for the 'Cox's Orange Pippin' apple. In June and sometimes again in September it produces very fragrant snow white double flowers that, when fully opened, split their calyces, petals partly popping out from their sheaths like an eighteenth-century lady from her bodice. Its lax blue-green foliage can loll ten inches high by fifteen inches wide at maturity and requires support to look its best.

*D. plumarius* 'Dad's Favorite' bears large double snow white flowers in loose clusters, edged and centered with a very striking deep maroon. It bloomed from late June through July in an exceptionally hot American Dianthus Society test plot and was still putting up sporadic flowers in August. Said by some to date from the late 1700s, it is superb for boutonnieres and informal bouquets.

Of much more restrained habit is the modern 'Spring Beauty' strain, which forms compact blue-green clumps twelve inches high by sixteen inches wide over a long period. It produces fragrant, frilly, and double flowers in various shades ranging from white to dark rose. Many of the flowers bear beautifully contrasting centers, or "eyes," and concentric circles on the petals, known to dianthus growers as "zones."

Another reliable compact pink with blue-green foliage is *D. plumarius* 'Frost Fire', a clove-scented dark red double from five to six inches tall. Its color is very close to that of the David Austin rose 'William Shakespeare', which it complements beautifully. And for those gardeners who seek a sure thing, for sheer floriferousness under a wide range of climatic conditions no dianthus beats the compact, vigorous Allwood Brothers cultivars *D. × allwoodii* 'Doris', a semidouble light salmon pink with an azalea pink eye, and *D. × allwoodii* 'Helen', a double salmon pink.



ANITA SABARESE



Top: 'Telstar Crimson Picotee', a cultivar of the rainbow pink, is a hardy annual. Above: Among the group called cluster-head pinks is this yellow Yugoslavian perennial. Right: 'White Princess' is a cultivar of the Finnish sand pink, one of the first dianthuses to bloom in spring.



LEFT: DAVID CAVAGNARO, RIGHT: MICHAEL S. THOMPSON

### Hardy Perennial Border Carnations

Gardeners who have never grown *Dianthus* may still think of carnations as florist plants—inexpensive corsages worn to proms and weddings. While some of them are amenable only to greenhouse growing, the British have for years used hardy perennial carnations in their borders.

Most carnations are descended from *D. caryophyllus* and tend to have large clumps of thick, tightly curled foliage. Whereas pinks have small, single, fringed or feathered flowers, those of carnations are larger and double or semidouble. The border carnations are a bit more tender than the

hardy garden pinks, often requiring a protected spot when grown north of Zone 6.

The old standby *D. caryophyllus* 'Grenadin Strain' is still the one to try. Plants can form clumps up to two feet tall. While their blue-green basal foliage is sturdy, the stems they put up in June and July are frustratingly floppy, but perfect for an informal garden. These stems bear double (occasionally single) mini-carnations in loose clusters and colors that include white, a pure clear candy pink, fire engine red, dark red, and yellow. Scent is especially good in 'Grenadin White'. *D. caryophyllus* 'King of the Blacks' is said to be the most

## GROWING DIANTHUSES

strongly scented dark red border carnation. White and red carnations are particularly appealing against a backdrop of the cool, airy, bronze fennel, *Foeniculum vulgare* 'Giant Bronze'.

### Hardy Perennial Rock Garden Pinks

These are the dianthus to try where winters are harsh; many are hardy to Zone 3. They can probably be grown as far south as Zone 9, although they don't appreciate humidity and they demand excellent drainage. *Dianthus* 'La Bourboule' is a society favorite; it is often misnamed 'La Bourbille', 'La Bourbrille', or 'Labourbrille'. It is a charming half-inch-high mat-former bearing fragrant, deeply fringed pink flowers in late spring. 'La Bourboule Alba' bears white flowers. The tiny green spiky leaves stay neat and tidy.

Equally lovely is *D. arenarius*, the Finnish sand pink, which is up to six inches high, fragrant, fringed, and rampant; it is one of the first dianthus to bloom in the spring. *D. gratianopolitanus* (once *D. caesius*), the cheddar pink, bears very fragrant fringed and light pink flowers atop blue-green mounds around four inches high by twelve inches wide. A cheddar hybrid, *D.* 'Pretty Dottie', is a charming fragrant single white and maroon bicolor. Another, *D.* 'Spotty' (sometimes listed as 'Spotti'), bears five-petaled red blooms spotted white atop gray green mounds. Four-to-six-inch-high *D.* 'Tiny Rubies' covers one-foot-wide mats with wee clove-scented double rose pink flowers, good for candying.

Other useful long-bloomers include the Allwoodii Alpinus hybrids, particularly 'Patience', a fragrant, single pale rose with a red eye; the tufted, grassy, unscented maiden pink, *D. deltoides*, blooming white, pink, or rose red; *D. deltoides* 'Brilliant', four to six inches high with vivid double crimson flowers; *D.* 'Mrs. Holt', which forms tight six-inch-high cushions of clear pink; and the four-inch-high by six-inch-wide mat-former *D.* 'Pike's Pink', which bears semidouble to double Persian rose flowers, each with a cyclamen pink zone.

### Clusterhead Pinks

The clusterhead pinks carry their flowers in loose or tight umbels. Best known is the sweet William (*D. barbatus*), a short-lived peren-

Although dianthus have a reputation for being difficult to grow, the majority have only three general cultural requirements: alkaline soil, full sun (although in areas with baking summers, many dianthus do best protected from afternoon burn), and good drainage, particularly in winter. If you have tried to overwinter pinks and failed, you might be judging low temperatures to be the villain when in fact it was crown rot brought on by wet winter feet.

Many species and strains are easy to propagate from seed. Named cultivars usually must be propagated by cuttings and division. Take cuttings in July or August after plants have bloomed but before active growth has ceased. Divide plants in early spring before active growth starts.

To grow dianthus from seed, for optimum results you will need a well-drained, slightly moistened planting mix, such as equal parts commercial sterile seed-sowing soil and coarse builder's sand; bottom heat to hasten germination; solid trays to support bottom watering and good air circulation to help prevent damping-off; an environment around 55 degrees for growing seedlings; and the brightest light available. I have had good results using a bottom-watered, commercial seed-starting unit, the Gardener's Supply Company's Accelerated Propagation System, but expensive equipment is not necessary.

Some gardeners begin by soaking seed overnight in a solution of one tablespoon liquid seaweed, which serves as a growth stimulant, to one gallon of warm water. Although wet dianthus seed is very difficult to sow evenly, this procedure seems to hasten germination. Others immerse soil-filled planting cells in very hot water just before sowing to soften the seed-coats and dissolve any natural chemical sprouting inhibitors. In any case, sow seeds thinly on the surface of the medium and cover very lightly with soil, no more than one-eighth of an inch deep. If possible, sprinkle a fine layer of coarse turkey grit, available at poultry feed stores, over your flats to amplify the light striking them and to give easily rotted seedling crowns protection from excess surface moisture. They will grow up through the grit.

Cover the flats with clear plastic, rest them in watertight trays, and place them over heating mats or in a warm spot. When seedlings appear, remove the plastic and place the trays in a cool, well-ventilated room several inches below fluorescent lights or in the sunniest window. Mist daily as required to keep the soil surface barely moist.

When seedlings have developed true leaves—the leaves that appear after the first two, which are cotyledons—add quarter-strength commercial fertilizer or liquid seaweed solution to your misting water. When seedlings are big enough that misting is no longer sufficient to keep their growing medium moist, water sparingly from the bottom. Do not let water stand in the trays.

Plant out in a sunny, well-drained spot after danger from hard frost has passed (cover at night with inverted clay pots until the leaves toughen up). Avoid any location where water stands in winter or the snow cover remains for an unusually long time in the spring. Dianthus do not require heavy fertilization. It will be sufficient at planting time to mix into your beds some well-rotted compost and some commercial fertilizer or a combination of compost with a mixture of one part cottonseed meal, fish meal, or blood meal plus one part rock phosphate or bone meal and a dash of kelp or alfalfa meal for micronutrients.

To extend bloom, keep faded blossoms picked off (this is quite a chore if done one flower at a time; some dianthomanees give clumps wholesale haircuts with their shears). In the autumn, clear the plants' bases of dead vegetation, including fallen leaves, so as to discourage wet matting in winter and the fungal diseases that ensue. If you must cover your clumps, use evergreen boughs or some other covering that will not mat. Try to keep dogs from tromping through beds of the taller pinks, whose stems tend to be brittle. Check for heaving during winter thaws. When spring growth becomes evident, snip off any browned material, but don't be too hasty; branches that seem dead may return to their blue- or gray green under the warmth of the new sun.

Problems may include blister beetles, grasshoppers, slugs, and sowbugs and, in humid areas, black spot, rust, and fusarium wilt.

—Rand B. Lee



*Top: Dianthus × allwoodii 'Helen' flowers generously in a wide range of climates. Above: The sweet William is a hardy biennial clusterhead.*

nial treated as an annual or biennial. Most sweet Williams bloom in June and July, bearing single to double flowers in white, pink, salmon, red, and dark red, sometimes solid, sometimes marked with concentric circles of contrasting hue. 'Excelsior Strain', which grows to one and a half feet tall, is more fragrant than most and beautifully colored. The charming dwarf 'Wee Willie' strain, about six inches tall, resembles the original sweet Williams brought into England from Germany in the sixteenth century.

Another favorite clusterhead is the yellow Yugoslavian perennial pink, *D. knappii*. A perennial hardy in Zones 3-9, it grows a foot to a foot and a half high and bears on stiff upright stems loose clusters of small, single-toothed sulphur yellow flowers for a month or more in mid- to late summer. Try it with harebells (*Campanula rotundifolia*), the annual scarlet flax (*Linum rubrum*), or perennial blue flax (*L. perenne*).

### Annual Pinks & Carnations

From the tender perennial China or rainbow pink (*Dianthus chinensis*) spring many dianthus strains that bloom the first year from seed. Boasting soft, fresh green foliage, the "annual" pinks—though virtually scentless—add sturdy, heat-resistant color all summer long to window boxes, container gardens, and bedding schemes. Annual pinks can usually be overwintered from Zone 6 southwards; some are even hardier. 'Carpet Series' is popular, particularly 'Carpet Series Snowfire', which features striking white flowers centered with bright cherry red on plants six to twelve inches high. 'Ideal Series Violet' offers velvety dark purple blooms on ten-inch, sub-zero hardy plants. 'Magic Charms Series' grows six to eight inches tall, blooming blood red, coral, pink, and white. 'Telstar Series Crimson Picotee', a six- to eight-inch fringed crimson edged in white, has been known to survive a Nebraska winter in an iron kettle with no protection.

Those seeking a fast-blooming "annual" carnation can hardly do better than *D. caryophyllus* 'Dwarf Fragrance'. Scented, sturdy, and floriferous, it blooms in five months from seed in a wide range of colors.

For those seeking to bring cooling foliage, fragrance, delicious color, and cot-

tage garden romance to borders, beds, or containers, the genus *Dianthus* is a treasure-trove of possibility.

*Rand B. Lee, who lives in Santa Fe, New Mexico, is the president of the American Dianthus Society.*

## SOURCES & RESOURCES

The American Dianthus Society was formed in 1991 to encourage the enjoyment and cultivation of the genus *Dianthus* in American gardens; to preserve and disseminate existing stocks of heirloom dianthus; and to bring the genus to the attention of American breeders, garden designers, landscapers, and nursery folk. It publishes a quarterly newsletter, *The Gilliflower Times*, and is developing an encyclopedia of commercially available dianthus. U.S. dues are \$10. To join, or to obtain a more detailed source list of plants listed in this article, write them at P.O. Box 22232, Santa Fe, NM 87502-2232.

### Sources of *Dianthus* include:

- Andre Viette, Route 1, Box 16, Fishersville, VA 22939, (703) 943-2315. Catalog \$2.
- Canyon Creek Nursery, 3527 Dry Creek Road, Oroville, CA 95965, (916) 533-2166. Catalog \$2.
- The Fragrant Path, P. O. Box 328, Fort Calhoun, NE 68023. Catalog \$1.
- J. L. Hudson, Seedsman, P.O. Box 1058, Redwood City, CA 94064. Catalog \$1.
- Lamb Nurseries, East 101 Sharp Avenue, Spokane, WA 99202, (509) 328-7956. Catalog \$1.
- Logee's Greenhouses, 55 North Street, Danielson, CT 06239, (203) 774-8038. Catalog \$3.
- Milaege's Gardens, 4838 Douglas Avenue, Racine, WI 53402, (414) 639-2371. Catalog \$1.
- Powell's Gardens, 9468 U.S. Highway 70 East, Princeton, NC 27569. Catalog \$3.
- Rice Creek Gardens, 1315 66th Avenue N.E., Minneapolis, MN 44432, (612) 574-1197. Catalog \$2.
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# PROVEN PERFORMERS African Violets

BY CAROL BRUCE

JUST OVER A CENTURY AGO, IN 1892, Baron Walter von Saint Paul noticed some lavender flowers growing on his vanilla plantation in German East Africa (now Tanzania). The Baron had an eye for flowers and his interest in these won him botanical immortality. He sent some of the plants home to his father, who passed them on to Herman Wendland, director of the Royal Botanical Gardens at Hanover, Germany. Wendland assigned the plants to the family Gesneriaceae and named them *Saintpaulia ionantha*, after the Saint Paul family and the Greek word for the color violet. By the following year these “African violets,” as they came to be called, were a horticultural rage. At the 1893 Ghent Quinquennial Flower Show, the baron’s flower shared with the orchid the honor of the “Best New Introduction of the Show.” Today, some twenty *Saintpaulia* species are known, all from Tanzania and Kenya. New subspecies

are still occasionally found—two were discovered as recently as 1991. But although additions to the genus are exciting, botanists are currently more concerned about possible losses. Several African violets are endangered and at least one, *S. inconspicua*, is thought to have already become extinct, in both nature and cultivation.

There is a resurgence of interest in growing *Saintpaulia* species, but the vast majority of African violet fanciers prefer hybrids. Since African violets hybridize readily—with intriguing results—they have long fascinated both commercial growers and basement hobbyists. Over 20,000 named cultivars have been produced so far, mostly from *S. ionantha*, though the pedigree of *Saintpaulia* hybrids is often uncertain. Whatever their origin, an estimated 50 to 100 million African violets are now sold annually in the United States alone.

In this country, the hybridizing rage began in the 1930s, when the Los Angeles nursery of Armacost and Royston released ten cultivars, all with single blooms in the lavender-to-purple range. In 1939, Michigan grower Edward Wangbichler discovered a double-flowered specimen. By the early 1940s, Holton and Hunkel nursery in Milwaukee had patented a pink mutation. Today African violets come in an extraordinary variety of forms and colors. Their leaves may be spooned, ruffled, lobed, or scalloped, and variegated in pink, yellow, white, or tan. Their flowers may be single, semidouble, or double, and ruffled, frilled, or wasp-shaped. They bloom in white, pink, coral, green, and almost red, and these colors may be solid, splotched, streaked, edged in another color, or even striped.

With thousands of cultivars available, choosing the very best is a formidable task. My choices are based on the “Best Varieties” list published each year by the African Violet Society of America (AVSA), a membership society for African violet enthusiasts and the international registration authority for the genus *Saintpaulia*. The “Best Varieties” list is determined by poll-

*‘Majesty’ is one of the first African violets that has flowers with yellowish tones.*



COURTESY OF AFRICAN VIOLET MAGAZINE

## PLENTY OF LIGHT MEANS PLENTY OF FLOWERS

The first growers of African violets lost many of their specimens because they tried to duplicate what they imagined to be the plants's gloomy, wet growing conditions in "darkest Africa." In fact, most species occur on well-drained, rocky mountain niches dappled with equatorial light. If you imitate these conditions, some cultivars will bloom nonstop for months.

Generally, if it hasn't bloomed, it needs more light. African violets do best with twelve to sixteen hours of either natural or fluorescent light a day. Since natural light is unpredictable, most serious growers use double-tube, forty-eight-inch fluorescent lights. Placed with their foliage eight to ten inches below the lights, plants usually start budding in a few weeks.

Light is the key to the African violet's bloom cycle, but water is the key to growth. It doesn't matter whether the plants are watered from the top or bottom, but it is important to give them the proper amount of water. To understand the ideal watering, it may help to visualize your favorite cake. The potting soil should always have a moist, spongy, "cakelike" texture. It shouldn't be soggy, nor should it be dry and crusty around the edges.

To achieve this ideal, the most popular method is wick watering. To wick a plant, it must be planted in a porous medium of which one-quarter to one-third is perlite. The wick must run from a reservoir below the pot, through the pot's drainage hole, and well into the soil. You can make a wick from four-ply knitting-worsted acrylic yarn or a matchstick-thin nylon cord. (Do not use natural fibers because they will disintegrate). If you use the yarn, you may need to rub it under water to break its initial water resistance. Reservoirs can be made from margarine tubs or similar containers. Just cut a small hole in the lid, fill the reservoir with a dilute fertilizer solution, and set the plant on top so that the wick hangs freely through the hole into the liquid. To start the wick, or whenever the reservoir goes dry, water the plant from the top. Every couple of months, the plant should be watered heavily from the top to flush out excess salts.

The growing medium should be light, porous, and pasteurized, with a pH of about 6.5. A commercial African violet medium may be used or you can mix your own. A typical recipe is three parts dry peat moss, two parts vermiculite, one part perlite (two parts for wicking), one-half part hydrated water-holding polymer crystals, and dolomite lime if needed to raise the pH. African violet mixes con-

tain few nutrients, so fertilizing is necessary. The plants can be fed fertilizer constantly, either by wicking or by watering can. Use one-eighth to one-quarter teaspoon of 12-36-14 or 15-30-15 fertilizer per gallon of water.

African violets can be propagated readily from leaf cuttings. Remove a leaf that has grown about halfway to the edge of the rosette, then, using a sharp, clean razor blade, cut its petiole to one or one-and-a-half inches. Insert the petiole nearly to the bottom of the leaf into a small pot filled with soil. The cutting should be wicked, or it can be watered, allowed to drain, then popped into a clear plastic bag. After a few months, little "mouse ear" plantlets will appear. These may be gently separated from the "mother" leaf when they are an inch or more long. They should be potted individually in small pots. These will dry out quickly if they are not wicked.

Miniature and semiminiature African violets should have the same care as the larger cultivars, only more of it—except for fertilizer. Most will need more light to bloom and should be placed six to eight inches below the light tubes. They will also need to be watered more often, since they will be in smaller pots. Older leaves should be removed and plants should be repotted every three or four months so that the root ball can be trimmed and the soil refreshed. While some cultivars grow into perfect rosettes, others tend to sucker and need constant grooming to retain attractive shapes.

Trailers may be propagated either by leaf cuttings or by division if they have developed multiple crowns. The latter technique can produce rooted, blooming plants in only a few weeks. When taking a leaf cutting from a trailer, remove a stem with several pairs of leaves. Strip away the lowest pair and treat as you would a rosette leaf.

Probably the two most common maladies in African violets are mite infestations and a fungal infection called crown rot. To rid yourself of the mites, you may have to resort to a pesticide. To cure crown rot, it may be necessary to cut the stalk at the soil surface, remove infected tissue, treat with a fungicide, then reroot in vermiculite. To help keep your collection healthy, it's a good idea to quarantine new plants for at least two months.

Another common problem is caused by the accumulation of fertilizer salts on pot rims. The salts can damage leaves that touch the rims. Repotting plants, of course, is a sure solution, but some growers also cover the pot rims with foil. —Carol Bruce



*'Peppermint Kathy', an example of the "Suncoast" series.*

## PURSuing THE YELLOW VIOLET

ing AVSA members: to be listed, a cultivar must collect at least fifty votes. In 1992, members elected forty-one "Best Varieties."

What should a good African violet look like? According to criteria that AVSA uses to judge show specimens, a good African violet should be "symmetrical"—that is, round—and low. A rosette should have only a single crown, producing evenly distributed foliage. And it should produce lots of flowers—an average of twenty to twenty-five on a mature plant of normal size.

African violets are usually grouped into three categories, according to the form of the plant. The standard rosette is the low, round, single-crowned habit that you probably think of when you think of African violets. The miniature is just a small rosette. The trailer has multiple crowns and long, hanging stems. Here, grouped by category, are some of the 1992 "Best Varieties" that have proven themselves at my house.

### Rosettes

'Splendiferous' has the species tendency to drop its flowers early but in spite of this, I still think very highly of it. Its flowers are fringed singles with pink- and white-banded petals and fuchsia pink eyes. The flowers contrast strongly with its large, dark green, quilted leaves.

'Something Special' lives up to its name. Although its large leaves are plain, it is a prolific bloomer, producing quantities of large bluish purple semidouble flowers.

'Melody Kimi' is another prolific bloomer. Its double flowers are a deep bluish purple and the lower petals are marked with white bibs. Its foliage is the plain, tailored, medium green found in most cultivars produced by large-scale nurseries.

'Happy Cricket' topped the "Best Varieties" list in 1992. This large, easy bloomer has big, wavy double flowers in two-toned lavender with some purple edging. Its ruffled leaves are dark green on top and red underneath.

'Mark' is a perennial show-winner. Its fringed, double blooms are a deep raspberry red and its dark green leaves are slightly ruffled.

'Tiger' is another classic. This large, strong grower has dramatically variegated leaves, and masses of old-fashioned dark bluish purple double flowers.



COURTESY OF AFRICAN VIOLET MAGAZINE

Nolan Blansit.

spotted a plant that had lost all its petals but still raised aloft its bright yellow anthers. Soon rumors were flying that a yellow African violet had been added to the handful of cultivars then known. But the yellow violet, if indeed there was one, never reappeared. Visions of yellow have haunted growers ever since.

The first attempts to breed a yellow violet yielded such early cultivars as 'Select Yellow Brown Boy' and 'Yellow Breakthrough'. But these did not produce true yellows and proved dead ends.

During the 1970s, researchers at the University of Wisconsin attempted to introduce red and yellow pigments into the *Saintpaulia* palette by hybridizing African violets with plants from a related genus, *Episcia*. But still no yellow violets emerged.

In 1980 Winston Smith, a *Saintpaulia* hybridizer well-known for his "Wrangler" and "Maverick" series cultivars, was startled by a scream from a visitor who had noticed a cluster of yellow blossoms in his greenhouse. Smith immediately took leaf cuttings from the plant, a mutation of 'White Silver Sands'. But in a quirk of Texas weather, a frost killed the yellow-blooming plant and all its offspring.

It was the fate of another hybridizer, Nolan Blansit, to succeed where others had failed. But as Blansit recalls it, his achievement was not entirely due to his own efforts. Blansit's background had been in hybridizing *Episcia*. In 1977, when he and his wife, Cindy, were driving through California on their honeymoon, Blansit heard a clear voice say, "I want you to trust me for a yellow African violet." Astounded, he pulled the car over and hesitantly told his bride of the divine inspiration. Immediately after the honeymoon, Blansit outfitted his mother's basement with lights and benches and began his search for the elusive yellow.

It took more than ten years and thousands of crosses, but in May 1989, *African Violet Magazine* published photos of Blansit's first yellow violets: the blossoms were not solid colored but instead showed combinations of yellow, peach, and orange. Blansit wanted to stabilize the color before releasing plants to the public, but in June 1992, he marketed 600 small plants through the Violet Express company in Eagle River, Wisconsin. Even at \$50 apiece, the plants quickly sold out.

"The reaction to my plants has been exceptional," says Blansit. "There has been such a hunger to see new colors."

And Blansit thinks he is well on the way to a solid yellow. "We're probably 70 percent of the way there. It's been very slow, but improvements are steady." His breeding has also produced oranges "with yellow influences," shades of salmon and pink—even an ivory.

Currently, Blansit supervises the hybridizing program for Green Circle Growers in Oberlin, Ohio, the third largest wholesaler of African violets in the country. He plans to release another batch of yellow violets this summer, once again through Violet Express. His cultivars should also begin turning up on other grower's lists, perhaps as soon as this summer.

Blansit's cultivars include 'His Promise', which has double flowers in blush white streaked with yellow. 'Majesty' has white, slightly frilled blossoms with yellow and pink marks. 'Heavenly Dawn' has small but prolific semidouble flowers. Their color is ivory, with shadings of peach, apricot, or sometimes yellow, over bronze green leaves.

—Carol Bruce



*Its two-tone flowers put 'Melody Kimi' on the 1992 African Violet Society of America's "Best Varieties" list.*

COURTESY OF AFRICAN VIOLET MAGAZINE

often fragile. Tastes have changed since then, but because the large growers have only recently begun to work with minis, they are still not widely known.

True miniatures are no more than six inches across. Plants growing up to eight inches are called semiminiatures. There are now exceptional hybrids in both categories and several semiminis have made it on to AVSA's "Best Varieties" list. Among these is 'Precious Pink', which grows without coaxing into a perfect rosette of variegated green, white, and pink leaves and is usually covered in pink flowers. Two other pink semiminis are also listed: 'Little Pro', which has tailored green leaves, and 'Snuggles', which has variegated foliage.

Another notable semimini is 'Irish Flirt', which was awarded Best New Cultivar at the 1990 AVSA and New York State conventions. 'Irish Flirt' is a rosette of shiny, medium green, slightly wavy leaves, topped with bright green double flowers.

As the interest in miniatures mounts, some growers are producing even smaller plants. It has recently become popular to train down the smaller miniatures as microminis and grow them in one-and-a-half inch pots. But plants this small must be wick watered or watered daily. (See sidebar on page 18.) One grower, Holtkamp Greenhouses in Nashville, Tennessee, has even begun marketing a series of "Little Jewels" in thumb pots already wicked into miniwells.

### Trailers

Another increasingly popular form is the trailer. Trailers develop long stems that dangle over the rims of their pots, making them ideal for hanging baskets or taller containers. The first trailers on the market derived from the sparsely blooming species *S. grottei*. They were offered in 1954 by Tinari Greenhouses. But their lack of flowers and their tendency to sprawl made these early plants unpopular. Then *S. magungensis*, another trailing species, was added to the gene pool and crosses with miniatures also helped to overcome the sprawling tendencies. Recent trailers are free-branching, dense plants, often covered with hundreds of flowers.

One of my favorite trailers is 'Falling Snow'. This fairly small cultivar blooms

continuously with white semidouble flowers. 'Pixie Blue' and 'Dancin' Trail' also deserve mention. 'Dancin' Trail' has dark red double flowers over compact foliage, while 'Pixie Blue', an older form, has old-fashioned single, purplish blue flowers.

These are some of my favorites, but you need not limit yourself to the ones listed here. There is a wealth of possibilities in the vast number of hybrids already on the market—and of course you could always make some crosses of your own. Who knows? Maybe the next proven performer will be one of yours.

*Carol Bruce, a free-lance writer living in Las Vegas, Nevada, has been raising African violets for more than twenty years.*

## SOURCES & RESOURCES

The African Violet Society of America is a nonprofit membership organization devoted to growing, showing, and encouraging research on the genus *Saintpaulia*. AVSA maintains a Master Variety list for the genus, which records both species and registered cultivars. Through its 500 chapters, AVSA also sponsors regular exhibits, where new cultivars are shown and judged. Membership in AVSA is \$13.50 per year and includes a subscription to the bimonthly *African Violet Magazine*. (The "Best Varieties" list appears annually in the November-December issue.) Members may also show or sell their violets at events sponsored by AVSA affiliates and they have access to the latest information on the culture of *Saintpaulia*. Contact AVSA at P.O. Box 3609, Beaumont, TX 77704, (409) 839-4725.

### Sources of African violets include:

Holtkamp Greenhouses, P.O. Box 78565, Nashville, TN 37207, (615) 228-2683. Catalog free.

Lyndon Lyon Greenhouse, 14 Mutchler Street, Dolgeville, NY 13329, (315) 429-8291. Catalog free.

Tinari Greenhouses, 2325 Valley Road, Huntingdon Valley, PA 19006-0190, (215) 947-0144. Catalog 50 cents.

Violet Express, 1440-41 Everett Road, Eagle River, WI 54521, (715) 479-3099. Catalog \$2.50.

Some *Saintpaulia* hybrids are "chimeras"—a term used for plants whose cells are not genetically identical. In a chimera, cells from one genetic line grow alongside cells from another line. Since the two lines do not occur in the same cells, chimeras cannot reproduce sexually, but only through tissue culture or suckers. (See "Attainable Chimeras," *American Horticulturist*, December 1991.)

One of the best chimeras is the rosette 'Granger's Desert Dawn'. Its blossoms are a light coral pink with distinct darker stripes down the center of each petal. The symmetrical plant has plain leaves.

'Kiwi Dazzle', a chimera rosette from New Zealand, is a prolific bloomer. Its flowers are fringed and striped—red on the sides, white down the centers. They grow high over medium green, plain leaves.

In addition to these individual hybrids, keep an eye out for any plants belonging to the more successful series, like Winston Smith's "Wrangler" series or the "Sun-coast" series by Sandra Williams.

### Miniatures

Miniature African violets are attracting more and more attention these days, though they have actually been around for a while. The first registered miniature, a mutation named 'Miss Liberty', was released in 1951 by Tinari Greenhouses in Huntingdon Valley, Pennsylvania. But at the time, most growers were trying to produce huge specimens and cared little for such "tea-cup African violets," which were



PROVEN PERFORMERS

# Lilies

BY CALVIN HELSLEY

WHETHER IT'S "THE LILIES OF THE FIELD" in the famous parable or the Madonna lilies associated with the Virgin Mary, lilies seem to have the power to inspire religious awe. But for gardeners, they can also inspire fear. Lilies have a bad horticultural reputation. They are widely regarded as difficult plants—and many of them are. But if you take the trouble to look, you can find a wide variety of lilies that will reward even gardeners of little faith.

Most gardeners know the tiger lily (*Lilium lancifolium* or *L. tigrinum*) and the Easter lily (*L. longiflorum*). And most have probably seen some exotic oriental lilies, at least in florists' arrangements. But these few examples don't begin to suggest the full diversity of the lily genus. Modern lily hybrids bloom in almost every color except blue—you'll find lilies in white, yellow, red, orange, pink, and green, both as solids and in gaudy combinations. And

flower shapes are almost as varied as the colors. Petals may bend back to the base of the flower, forming a "turk's cap," or remain fairly straight, producing a flat face. Some lilies look like a chalice; others like a trumpet. Lily blooms may be only an inch across, as in some of the species, or they may measure a full foot, as with some of the oriental hybrids. Plant height, too, varies from about twenty inches, with the 'Pixie' hybrids, to six or seven feet in some of the trumpet hybrids.

You can find a lily to fit almost any garden situation, whether you need a diminutive species for a rock garden or a big, robust plant for a perennial border. And by choosing carefully from the species and hybrids on the market, you can have a lily in flower for practically the entire growing season. For several years in my Zone 6 garden in Missouri, I have had lilies blooming from the end of May, when the martagon hybrids unfold, until the frost cuts down my last *L. formosanum* in October.

Behind all this variety are the roughly 100 species that make up the genus *Lilium*. Lily species are perennial and occur

*'Casa Blanca', one of the most popular orientals, is a florists' standby.*

throughout the northern temperate zone. Typically, they grow from bulbs composed of fleshy scales attached to a basal plate. Their stems produce scattered or whorled leaves and culminate in an inflorescence. It's important to distinguish true lilies from the many other plants that share their name, such as the daylily (*Hemerocallis*), lily-of-the-valley (*Convallaria*), or the spider lily (*Hymenocallis*). While the last grows from bulbs, other "imitation lilies" often have tuberous or fibrous roots, rather than the real bulb typical of *Lilium*.

Lily species have been cultivated for thousands of years, for ornament and medicine—even for food. (Lily bulbs are said to taste like potatoes.) But the earliest known hybrid lilies date only from the 1830s. Even so, that century and a half of breeding has produced a bewildering array of cultivars and more are added every year. To keep track of all this diversity, the Royal Horticultural Society in England, the international registration authority for the genus, has worked out a lily classification scheme.

It's helpful to know how the scheme works. Catalogs of lily specialists sometimes use it to list their offerings and, even where the system isn't followed to the letter, most of the terms for classifying lilies are derived from it. You can use it too, as the basis for choosing plants for your garden. There are eight divisions in the system, each of which contains cultivars derived from a particular set of species. (A ninth division, not discussed here, is reserved for the species themselves.) Some divisions are broken down into subdivisions by flower shape and orientation. Three orientations are recognized: upward facing, outward facing, and pendent.

As we look through the divisions, you will see that although many hybrids are introduced each year, relatively few stand the test of time and are worth keeping in the garden year after year. The following are those that I have selected as dependable performers throughout much of the country.

### **Division I: Asiatic Hybrids**

These cultivars come from a large group of relatively easy-to-grow species native to China, Japan, and Korea, though a few European species are also represented. Hybridizers, both commercial and amateur, have worked extensively with this group

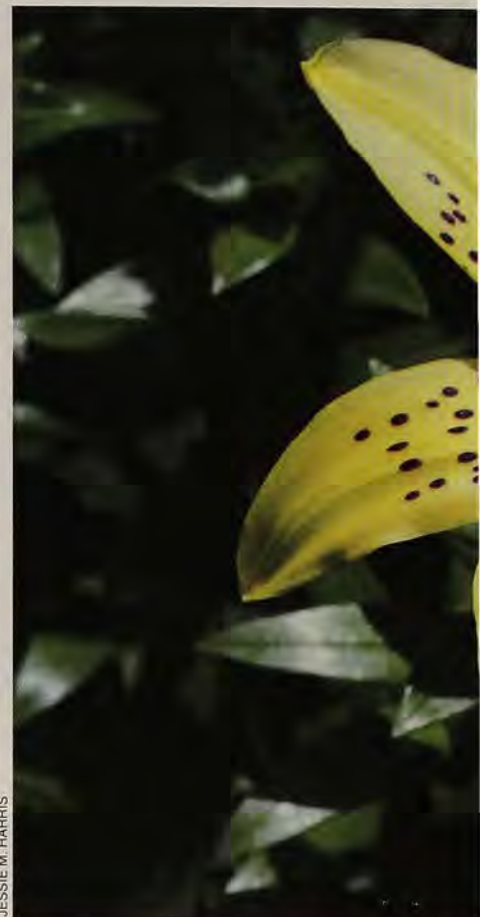
and most modern hybrids are grouped here. Thus, it's not surprising that this division should be the most diverse. Here is where you find the greatest variety in color and flower form, as well as the longest blooming season. Usually, though, Asiatics have no fragrance.

One reliable group of Asiatics is the "Connecticut" series developed in the 1950s and '60s by independent breeders David Stone and Henry Payne, both of whom are now deceased. For years, 'Connecticut King' has been a staple in the cut flower market and it has proven a reliable garden lily as well. Its spotless, deep yellow flowers with a gold flush in the center make it a favorite for many. Two other early Connecticut hybrids that remain high on my list are 'Connecticut Yankee', a spotless orange, and 'Nutmegger', a heavily spotted yellow. Although their flower form has been surpassed by more recent hybrids, few newer hybrids can top the overall display that these two lilies achieve. Both are tall, vigorous growers that are great for the back of the perennial border. Another wonderful Stone and Payne lily is 'Yellow Blaze'. This strain is generally represented by a super vigorous clone that is a consistent, summertime performer.

If you like pink, consider 'Sally', hybridized by Richard Lighty of the Mount Cuba Center for the Study of Piedmont Flora, and 'Tiger Babies' by Judith McRae of Columbia-Platte Lilies. Both produce beautiful flowers in salmon pink with a coral center. Both are sturdy, vigorous, and justifiably popular.

Two lilies that I will always grow are 'Maple Cream' and 'Miss Alice', both by Julius Wadkamper of Borbeleta Gardens. 'Maple Cream' is exactly the color of maple cream candy, with a few dark spots towards the center of its beige pink flowers. 'Miss Alice' is a tall, spotless red. It is vigorous and one of the most beautiful lilies for the garden.

Three newer hybrids that I expect to see for many years to come are 'Timepiece', by Hartle-Gilman Lilies; 'Cabaret', by Vicki Bowen, an independent breeder in Rockville, Maryland; and 'Willowwood', by Wadkamper. 'Timepiece' blooms in a splash of brilliant orange with a clocklike spotting pattern at the center—the feature



JESSIE M. HARRIS

from which it is named. Both 'Cabaret' and 'Willowwood' are yellow with a dark red "brushmark," a pattern increasingly seen over the last fifteen years, in which each petal looks as if it has been touched by a paintbrush.

### **Division II: Martagon Hybrids**

These exquisite lilies are derived from two species, *L. martagon* and *L. hansonii*. They have relatively small, turk's cap flowers and rather wide foliage arranged in whorls. Although they are fairly easy to care for once they are established, martagon bulbs may not sprout their first year. They are also very slow to propagate, so they aren't sold widely and they tend to be expensive. But martagons are beautiful, durable, very long-lived, and among the first lilies to bloom. *L. × dalhansonii*, perhaps the most famous of them, has been around for a century and is still worth growing. It has glossy, purplish brown to mahogany red flowers.



DAVID CAVAGNARO

*The Asiatics are the most diverse of the lily divisions. 'Yellow Blaze', left, is an older Asiatic cultivar of proven vigor and consistency. 'Red Velvet', right, is a spectacular example of what polyploid hybridization can do.*

### **Divisions III, IV, & V: Candidum, American, & Longiflorum Hybrids**

The next three divisions are stocked with interesting plants, but few of them could safely be called “proven performers.” Division III contains hybrids mostly from *L. candidum*, the Madonna lily. One of the oldest known hybrids, *L. × testaceum*, is placed here, but there are very few modern hybrids available from this group.

Division IV contains cultivars derived from species native to North America. Most of these species occur on the West Coast and have proven difficult to grow elsewhere. Perhaps that is the reason for the rather limited hybridization within this group. Division IV hybrids are also rare in the trade.

In Division V, we find hybrids derived from the Easter lily, *L. longiflorum*, and a Taiwanese lily, *L. formosanum*. A number of these cultivars, sometimes called “LA Hybrids” (for “Longiflorum-Asiatic”) are

just becoming available. They bloom in white, yellow, red, pink, and green. Their flowers are usually bowl shaped. Most LA hybrids have not been available long enough to have proven themselves.

### **Division VI: Trumpet & Aurelian Hybrids**

This group includes hybrids of a number of Asiatic species, mostly with trumpet-shaped flowers. Particularly important among these species is *L. henryi*, whose flowers, however, have a starburst instead of a trumpet form. (Cultivars of *L. henryi* are called aurelians.) The lilies in this division are among the easiest to grow in the entire genus. Many are also fragrant and will even attract hummingbirds. They usually flower later than the previous divisions and they're usually taller. They flower in white, pink, yellow, orange, and green. In addition to the trumpet and starburst flower forms, you'll find some bowl-

shaped flowers, as well as some with recurving petals.

I have a particular fondness for Division VI, and if I had to pick my absolute favorite lily, I would tend to favor the aurelian ‘White Henryi’ by Leslie Woodriff. Its large, flat-faced flowers are a creamy white with orange centers. Over the center is a speckling of brown papillae. (These are tiny bumps that occur on some lily petals.) Each stem may produce as many as twenty flowers, providing several weeks of bloom. ‘White Henryi’ is vigorous as well as beautiful and has been elevated to the North American Lily Society’s “Hall of Fame.” To make the Hall of Fame, a hybrid must place first at least five times in the annual popularity poll that the society conducts among its members.

‘Gold Eagle’ is another “must have” from Division VI. Its wide, flat flowers of golden yellow are lightly sprinkled with small cinnamon spots. Its beauty and deli-

## DRAINAGE IS CRITICAL FOR HANDLING LILIES

**G**rowing modern hybrid lilies is really quite simple if you meet their one major requirement: good drainage. They can be grown successfully in a range of soil, light, and nutrient conditions, but they simply will not tolerate “wet feet.”

Lilies are hardy perennial bulbs. You will be leaving them undisturbed for three to four years, so make an effort to plant them with care. You can plant them in either fall or spring but either way, start out right by buying fresh, healthy bulbs. Bulbs that have dried and started to sprout seldom bloom their first year and often don't even survive.

Select a well-drained area with plenty of sunlight. Avoid areas where water collects after a rain. If you are in doubt about the natural drainage of the site, make raised beds with rocks, bricks, cinder blocks, or railway ties. Mound the beds with loamy soil enriched with compost or peat moss. Add some sand too.

When planting, mix a tablespoon of a balanced granular fertilizer in the soil below the bulb. (Do not fertilize lilies with manures or high nitrogen fertilizers.) Plant the bulb with the roots down and cover with four to six inches of soil. Lilies are heavy feeders and form roots on the stem, so sprinkle more fertilizer on top of the soil to feed the stem roots. Water the area and mulch.

Each spring a light sprinkling of fertilizer scratched into the surface is beneficial. But be careful: new growth is very tender and breaks easily, so avoid digging until all stems have poked through the ground.

Lilies multiply by division of the main bulb and by the formation of smaller “bulblets” on the stem just above the main bulb. Every three or four years, this clump should be dug up and divided. Do your digging in October, and be sure to replant your lilies in new soil.

Just a few years ago, available hybrid lilies required a lot of “babying.” Growers had to be vigilant against a host of dreadful maladies, including lily mosaic (a complex of viruses that attack the foliage), fusarium rot (a bulb and root fungus), and botrytis (another fungus that attacks the entire plant above the soil). Today's hybrids generally have some disease resistance, though you may still need an insecticide and, to control botrytis, a fungicide. —Calvin Helsley



MICHAEL S. THOMPSON

‘Connecticut King’, an Asiatic, is popular with both florists and gardeners.

cious fragrance could make it one of your best performers for July.

### *Division VII: Oriental Hybrids*

These hybrids derive from species native to East Asia, mainly to Japan. The most important forebears of Division VII are the gold band lily, *L. auratum*, and the ‘Rubrum’ cultivar of *L. speciosum*. Orientals are considered the showiest of the lilies. They produce spectacular flowers, usually in white, pink, and red, and often with fascinating spotting patterns. A potent, spicy fragrance is also characteristic of the group. Sometimes this scent is so strong that it can be overpowering indoors.

Such exotic splendor doesn't always come easily. Orientals tend to be more exacting in their requirements than other lilies, and that's why I'm reluctant to recommend them to gardeners just getting started with the genus. But those beginners who cannot be dissuaded should give ‘Black Beauty’ a try. Though it's classified as an oriental, ‘Black Beauty’ has *L. henryi* in its parentage, which makes it far more rugged than most Division VII plants. ‘Black Beauty’ blooms are a deep black-red edged in white and with a green, star-shaped nectary at the center. Its stems can easily carry thirty to fifty flowers apiece. ‘Black Beauty’ is as spectacular as many other orientals, and far less temperamental. I still consider it one of the best performers—it rivals ‘White Henryi’ on my personal list of favorites. Like ‘White Henryi’, ‘Black Beauty’ was hybridized by Woodriff and it too is in the lily society's “Hall of Fame.”

I would cite two other orientals as especially durable. ‘Journey's End’ has performed well in many gardens. It has deep red flowers with chocolate nectaries. Very popular and one of the most beautiful of all the lilies is ‘Casa Blanca’. Florists have come to rely on its huge, spotless white flowers and it has proven a good garden plant too.

### *Hybrids of the Future*

Division VIII is a catch-all category, set up to include any hybrid that doesn't find a place in the previous seven divisions. At present it has very few members. But this scarcity is not likely to continue for long,





ANITA SABARESE

*'Sally', which is salmon pink with conspicuous coral spots, has three sets of chromosomes. Such polyploids tend to be virtually indestructible.*

since lily breeders are constantly testing the limits of the other divisions by producing wider and more complex crosses.

Over the past decade, one of the most promising trends in lily breeding is a renewed interest in polyploid lilies. (A polyploid has three or more copies of each chromosome, instead of the normal complement of two.) There are already a number of well-established polyploids, most of which are triploids. (As the name suggests, a triploid has three sets of chromosomes.) 'Red Velvet', for instance, is a striking and reliable triploid Asiatic. 'Sally', mentioned earlier, is also a triploid.

But today many breeders are adding another set of chromosomes, to produce tetraploid hybrids. Though it's still early for tetraploids, two have already proven themselves to be excellent plants. Both were developed by independent breeder LeVern Freimann. 'Scarlett Delight' is the product of a cross between tetraploid forms of two

orientals, 'Journey's End' and 'Black Beauty'. But unlike most crosses involving the latter, 'Scarlett Delight' does not greatly resemble 'Black Beauty'. With its towering stems of large, deep rose red flowers edged in white, it is much closer to 'Journey's End'. One trait that it has in common with both parents is that it persists where other orientals fail. My other choice among the tetraploids is the Asiatic 'Apricot Supreme'. It is actually more orange than apricot, but its large flowers have the heavy substance typical of tetraploids and make a good addition to the garden.

Further breeding will no doubt produce other solid performers. But the varieties mentioned here should help you get over any fears you might still have of the lily. Soon maybe your own lilies will be inspiring other gardeners with awe.

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*Calvin Helsley has been growing and breeding lilies for over thirty years. He is the*

*owner of Ozark Mountain Lilies, a former president of the North American Lily Society, and its current publications manager.*

## SOURCES & RESOURCES

The North American Lily Society is an international nonprofit organization devoted to promoting interest in the genus *Lilium*. The society sponsors shows, encourages scientific research, and runs a lily bulb exchange. Annual membership dues are \$12.75 and include a subscription to the society's quarterly bulletin. Members also have access to the bulb exchange, a slide collection and library, and expert cultural advice. The society's 48-page handbook on lily culture, *Let's Grow Lilies*, is available for \$3.50. Contact the North American Lily Society at P.O. Box 272, Owatonna, MN 55060.

For sources of lily bulbs see page 37.

# Men Who've Loved Lilies

*Their high standards have given us hybrids that are both gorgeous and tough.*

BY MELISSA DODD ESKILSON

Searching for new species through Central China along the Yangtze River and its tributaries, plant collector Ernest H. Wilson knew that physical danger was always a possibility. On an expedition in the early 1900s he found a lily he had sought, *Lilium regale*—"crowned with . . . large funnel-shaped flowers . . . and laden with delicious perfume exhaled from every blossom"—perched on slate and mudstone cliffs prone to rockslides, flanking a narrow roadside that wound above a turbulent tributary. Wilson managed to collect about 7,000 of the lily's bulbs but as he was leaving the site a rockslide smashed into his caravan, lacerating his right leg and breaking it below the knee in two places.

Wilson's bone never set correctly and the explorer walked the rest of his life with a gait he proudly called his "lily limp." He thought this was a small price to pay. From the original 7,000 bulbs, he wrote, "sprung the millions [of regal lilies] now happily acclimated in American gardens and other gardens around the seas. Its beauty has captured all hearts at sight."

Such unswerving devotion is found today among breeders who—fortunately for today's gardeners—took up where explorers like Wilson left off. For just as in roses, peonies, lilacs, and irises, it's the

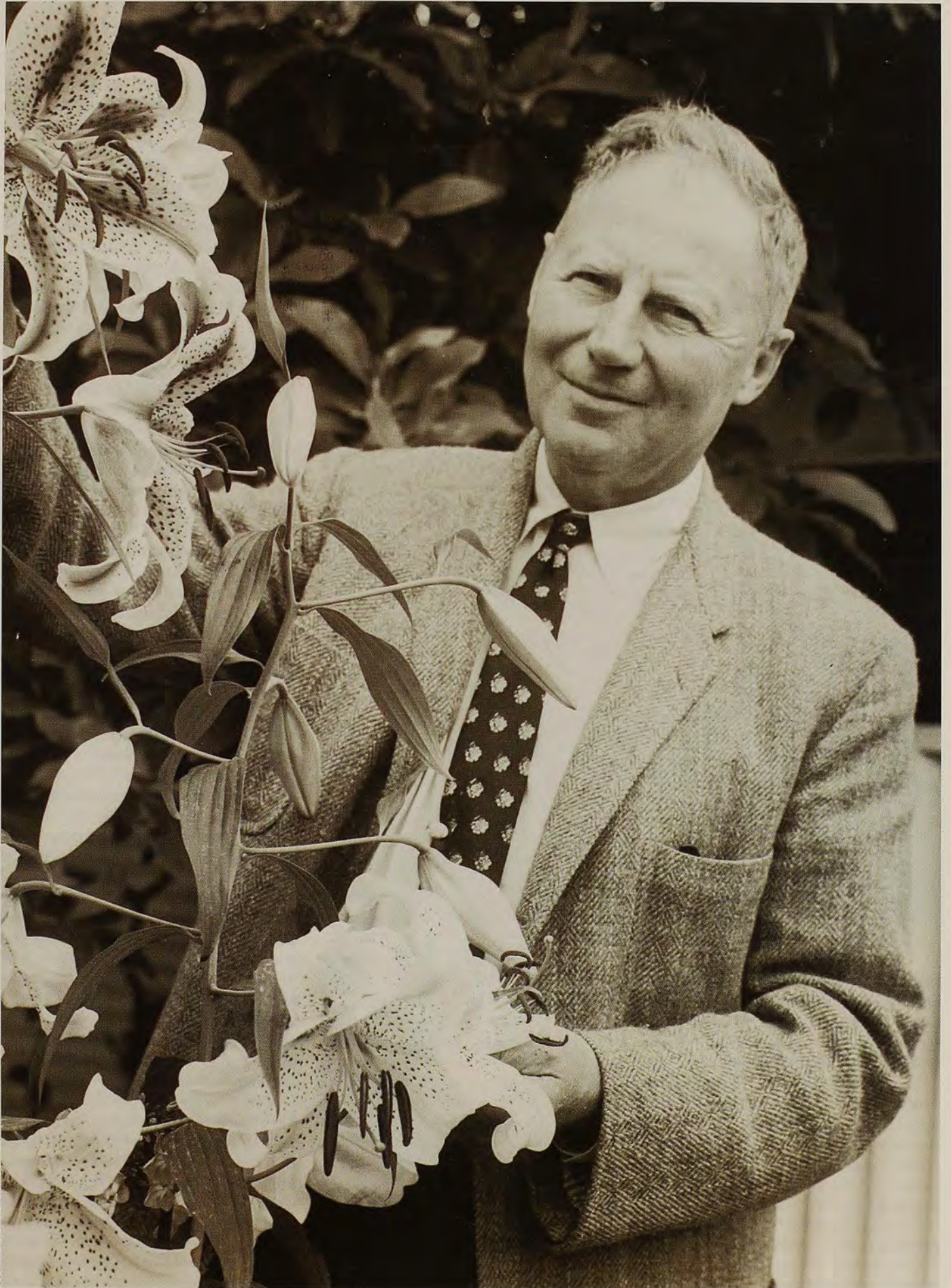
hybridized offspring of lily species that perform best in the garden, pot, and vase. Many of the lily species discovered and brought into cultivation from the 1830s to the early 1900s quickly became notorious for being temperamental and demanding. For decades, diehard lily lovers worldwide continued to dote on waning lilies stunted in stature and bloom. Then about 1925, breeding by a handful of hybridizers began to bear fruit. Within a few decades beautiful, healthy, adaptable, floriferous lilies with the constitutions of iron were readily available.

But while lily breeders haven't had to deal with anything akin to Wilson's lily limp, crossing promising lily parents and evaluating and selecting seedlings requires tremendous time and patience. A two- to three-year minimum is required to breed and evaluate a new cross. Before it goes to market, it spends another eighteen months in a tissue culture lab and another two years growing in the field to a marketable size. Anywhere along the line, a comely lily may be abandoned for one shortcoming or another. Not all plant breeders have such exacting standards. The Dutch, who dominate the cut-lily market, don't field trial their garden lilies, says Bob Gibson, co-owner of B&D Lilies in Port Townsend, Washington. But America's pioneer lily breeders, "were breeding for things

*The late Jan de Graaff, opposite, made lily-breeding history with his 'Enchantment', below.*



JOANNE PAVIA



COURTESY OF HERMAN V. WALL

## PROTECTING FUTURE LILIES



MARK W. SKINNER

### *Lilium pitkinense*.

But lily species, like many other flower types, are being increasingly threatened with extinction by loss of habitat and in some cases unchecked collection. Of the approximately 3,000 endangered wildflowers in North America, 400 are predicted to be extinct by the year 2000. Although there are no formal reports on wild-collecting of lily bulbs, lily cousins in the *Erythronium* genus are offered in several mail-order catalogs and the Natural Resources Defense Council fears most of the stock is collected in the wild. Of twenty-four North American native lilies, Nature Conservancy Chief Botanist Dr. Larry Morse reports that seven are in varying degrees "rare" and candidates for future federal listing as threatened or endangered species.

Most rare, and currently top priorities with the Conservancy, are the golden yellow, dark orange-spotted *L. iridollae*, which is native to southern Alabama and northwestern Florida, and the native Californian *L. pitkinense*, which is orange-scarlet suffused with yellow. "We must fully grasp how important it is to preserve the natural species," lily breeder Edward A. McRae, a former de Graaff associate, recently wrote. "Every effort must be made to establish meaningful populations, both in their natural environment and in cultivation. We can then do much to ensure that the unique beauty of both the species and hybrids from them endures for posterity."

Clearly, gardeners are no less dependent on the genetic diversity of plants than are breeders. Lily gardeners can help make a stand for the native species by:

- ☛ Actively questioning horticultural, mail-order catalog companies about their sources for native lily stock.
- ☛ Helping to establish populations of nursery propagated, native lily stock in private and public gardens and arboreta.
- ☛ Contributing to, and becoming active in, groups working to protect endangered lily species, such as local wildflower societies, the Nature Conservancy (1815 North Lynn Street, Arlington, VA 22209), the Natural Resources Defense Council (40 West 20th Street, New York, NY 10011), and the National Wildflower Research Center (2600 FM 973 North, Austin, TX 78725).

—Melissa Dodd Eskilson

that would last, that wouldn't pass on any disease susceptibility to future generations," Gibson says. Of the millions of seedlings grown in trialing fields, only 1 to 5 percent are ever sold commercially.

Undoubtedly the most well-known of American lily hybrid promoters was Jan de Graaff (1903-1990), the Dutch-born American bulbman who was the first to organize and oversee mass hybridizing and extensive field trialing in a systematic breeding program.

From among tens of thousands of seed-propagated lily crosses growing in a field at Oregon Bulb Farms (OBF) in Portland in 1941, de Graaff singled out Selection D

57 and jotted in his records: "VERY GOOD, nasturtium red, very fine." The lily was the hardy, highly adaptable, Asiatic 'Enchantment'. Asiatics are distinguished by leaves that form in whorls along their entire stem and cup-shaped flowers four to six inches wide that cluster at the top of the plant. They bloom any time from May to July but are typically scentless. 'Enchantment' combined the best characteristics of at least six species and changed lily history, according to one lily grower, "as surely and completely as Napoleon changed world history." Its most notable characteristic was its saturated color, but most important to growers was its disease

resistance. As a result of the de Graaff team's breeding and marketing successes, in the early 1980s the majority of lilies grown across the globe originated at OBF.

But while 'Enchantment' was a milestone in lily history, it was by no means the pinnacle. As de Graaff himself wrote, "Like clay in the hands of the master potter, new lilies can be modeled to our needs. We can draw on our imagination and then fuse their colors, their forms, and their good habits into new combinations. Much has already been accomplished, but much still remains to be done."

Continuing where de Graaff and other OBF hybridists left off is former OBF protégé Edward A. McRae, now research and development manager at the wholesale bulb-producing company Van der Salm Bulbfarms, Inc., in Woodland, Washington. McRae is something of an unsung hero in the lily gardening world; the names of his hybrids are probably better known than his own. His earliest successes at OBF, with the input of OBF lily hybridists Harold Comber and Earl Hornback, included the salmon peach 'Chinook', the unspotted pink 'Gypsy', and 'Sterling Star', which is white with black spots. Their pastel shades were a breakthrough and all had appealing upfacing blossoms. "These lilies were something totally new, unknown before I came to this country," relates McRae.

The United States got quite a catch when de Graaff hired McRae away from his Scottish homeland. Born in 1932 in the village of Echt, Aberdeenshire, he was introduced to horticulture in the flower and vegetable gardens of his maternal grandparents, who raised him after his mother's death when he was an infant. Though his grandmother was not formally educated, McRae remembers her "as quite a botanist in her own right, very knowledgeable about her plants, many of which were rare." One of the earliest photos of McRae shows him as a toddler standing next to a towering bed of tiger lilies.

McRae served an apprenticeship at Fyvie Castle Gardens near his birthplace, then three years in the Royal Air Force before beginning a three-year horticultural program at Edinburgh's Royal Botanic Garden. He stayed there another four years as botanical foreman. He had begun hankering for new challenges when he met de Graaff, who was looking for a protégé to study under Comber.

McRae arrived at OBF in the spring of 1961. "My horticultural and agricultural education had prepared me somewhat," he says, "but lily breeding is such a specialized business, I learned much of what I do after having come to the United States."

Into the mid '60s, McRae's greatest priority was increasing disease resistance in all types of lilies. When the industry emphasis shifted away from garden varieties to cut and potted lilies, McRae began focusing on Asiatic species and in crossing them inadvertently developed a new hybrid characteristic called brushmarks—attractive, contrasting dark blotches on petal centers. (Lily "petals" are technically tepals, which include petals and sepals.)

"I'd gone back to the species for certain characteristics," explains McRae, referring to lily species as if they were priceless old reference books, "and from seedlings in the second generation this unbelievable brushmark appeared. A complete surprise, but then dramatic surprises are often what you get when you return to the original material." The brushmark group, including the now classic hybrids 'Impact' and 'Vanguard', are, as a bonus, virus tolerant—and popular stock among breeders.

Also counted among McRae's finest achievements thus far are the fine yellow Asiatics 'Pollyanna', 'Cordelia', and 'Joanna' and McRae's miniature "Pixie" lilies, short in stature and long on performance as potted lilies.

One of McRae's current priorities is to increase the fertility of offspring of the wide cross pairing of fragrant oriental and aurelian lilies, thus to more easily produce hybrids in a new lily division that some are calling "orienpets." Orientals, developed from Japanese species, are outstanding for their open-faced, pendent, late season blooms, which can be from six to twelve inches wide. Heavy in substance, they often have reflexed or rippled petals, they often have a strong, spicy scent. Reds, pinks, and whites are their most common colors. Aurelians have a sweeter fragrance, with trumpet-shaped flowers that appear in midsummer, most frequently in pastels. They have taller, less wiry stems than orientals, and are somewhat more likely to be outward facing. Genetically, the two want little to do with each other. McRae's orienpets, which may be available within five years, are exhibiting fragrant upright flowers, excellent disease resistance, and a new range of colors, including peaches, rich reds, and unique bi-colors such as red with yellow margins.



COURTESY OF HERMAN V. WALL



COURTESY OF EDWARD A. MCRAE

*Edward McRae's many achievements include his "Pixie" series of miniatures, like 'Buff Pixie', left.*

Ron Beck, who worked with McRae at OBF, recalls that even in McRae's off hours, he was rarely far from the paraphernalia of lily-breeding. Former wife Judith McRae was an OBF geneticist. She now owns and operates the wholesale lily production company Columbia-Platte in Boring, Washington, and has bred award-winning lilies of her own. Their daughter Catherine, now 18, spent this past summer with her father, crossing and evaluating lilies at Van der Salm.

Social visits to the McRae home, said Beck, were like a trip to a science fair. "Like as not you'd find a microscope on the dining room table," he says, "focused on some minute lily reproductive part. And the entryway was full of lily breeding paraphernalia. You could always find a test tube or petri dish there—if you happened to need one."

Even more than McRae's novel household, Beck recalls the hybridist's energy and devotion. "I compare Eddie and his lilies to a father and his kids," he relates. "He lives and breathes his work. When I worked with him, he'd be out in the fields early in the morning, then at the warehouse by midmorning to make sure the bulbs were being packed and shipped properly. Still later he'd be back in the field."

But even though McRae's lily offspring could do no wrong in his eyes, Beck says, the breeder knew when to let go of a cross that was less than sterling, particularly in regard to disease resistance. Says McRae: "You have to have the faith you're doing something very creative and that eventually, if you keep on doing it, you'll bring a wealth of beauty to the world."

Among McRae's honors are the North American Lily Society's E. H. Wilson Award for individuals making outstanding contributions to the genus *Lilium* and the Royal Horticultural Society's equivalent, the Lyttel Cup.

Of late he's devoted considerable energy to preserving lily species threatened the world over by pollution and land development, to ensure that future breeders will be able to dip into the species germplasm in making their own crosses. He has directed a species preservation project at Portland's Berry Botanic Garden and is encouraging the lily society to begin species preservation research.

As McRae writes in the journal *Herbertia*, "There are ninety species of *Lilium* scattered throughout the Northern Hemisphere and approximately twenty-two of these have been used to produce the hybrid lilies sold in today's marketplace," some of these only sparingly.

A sign north of McKinleyville, located on the northern California coast, reads: "Turn here for lilies and begonias." The sign points the way to Fairyland Begonia and Lily Garden, a small retail and mail-order plant operation consisting of a greenhouse and two acres of fields surrounding a small, blue house. It is the base of operations for 82-year-old Leslie Woodruff, one of the world's most respected lily breeders.

Woodruff is perhaps most famous for 'Star Gazer', whose upfacing flower broke new ground among orientals. Crimson with dark spots and petals outlined in white, it is popular as a cut, potted, and garden lily and used extensively in Holland as both a cut flower and breeding base. Currently the Dutch are cultivating more than 1,000 acres of 'Star Gazer', almost four times the space devoted to the runner-up hybrid, yellow 'Connecticut King'. The first hybrid to combine characteristics from five Japanese species, 'Star Gazer' was simply another step in Woodruff's overall dream of producing what he calls the perfect lily: the first to bloom in the spring, the last to bloom in the fall, with the biggest flowers, best scent, and widest adaptability.

"With the work we're doing, I believe we can put pret' near all of them in one fertile mixture," Woodruff avers with a touch of the accent he retains from having lived in Texas and Colorado.

Besides 'Star Gazer', he has developed two other hybrids, the oriental 'Black Beauty' and the aurelian 'White Henry', whose popularity among lily gardeners warranted the lily society's creation of the Hall of Fame—lilies that have appeared so frequently in society popularity polls they deserve special status. To date 'Black Beauty' and 'White Henry' are the only lilies inducted. Both are famous for their vigor, their unparalleled hardiness, and disease resistance. The recurved petals of 'Black Beauty' are dark red with a green star in the center and petals outlined in white. It will grow up to nine feet tall with fifty or more flowers. 'White Henry' has a sunburst-shaped flower with an orange throat and cinnamon flecks. Says Woodruff proudly of 'Black Beauty': "It's a cross of a pink reflex from Japan and the orange reflex from China, specially selected from over 50,000 seedlings. Each parent is picky about its location, soil, and culture, but cross the two and they don't care *where* they grow."

Also to Woodruff's credit is the award-winning aurelian 'Gold Eagle', known for



MICHAEL S. THOMPSON

Leslie Woodruff, now 82, is famous for 'Star Gazer', above. Its upward-facing flowers are rare among oriental lilies.

COURTESY OF WINKEY WOODRUFF



its rich yellow, fragrant blossoms; the oriental 'Tempo', deep garnet with a white band and dark red spots; and 'Rosy', a rose-scented oriental with white petals overlaid with pink and red spots. Dutch-introduced lilies bred and reared first by Woodriff include baby pink 'Le Reve'; 'Laura Lee', which has deep pink spots and "whiskers" on its white petals; and 'Fellowship', white with a ruffled edge, pink center stripe, and pink to red spots.

Woodriff's influence on Holland's oriental lily culture has been so great that the Dutch Horticulture Advisory Service named a new lily, 'Woodriff's Memory', after him in 1990. In 1991 the Dutch Bulb Growers' Association gave him its Dix Award, the highest award given by the Dutch in the field of flower bulb breeding.

This man of many honors, including the E. H. Wilson Award, employs breeding methods that can perplex classically trained, systematic hybridizers. Although very mixed parentage is the rule among lily hybrids, many breeders, like race horse owners, can trace ancestors back several generations. Fellow breeder LeVern Freimann recalls the day he dropped in on Woodriff and found him pollinating breeding stock with mixed pollen taken from an assortment of lilies and kept in a fruit jar. "Some people consider this very unscientific," relates Freimann, "but in the final analysis you have to consider, 'What did the breeder accomplish?' And Woodriff's accomplished plenty."

Woodriff was born in Quanah, Texas, in 1910 but his family moved shortly afterwards to Colorado, where they took up cattle ranching. There at the age of 6 he met his first lily. "I saw a rubrum lily forced into flower by a friend of my Dad's. I loved the fragrance and color of the blossom so that I grew some seedlings," he recalls, then chuckles. "If chipmunks hadn't eaten my best seedlings back then, I'd be a millionaire today."

When Woodriff was 12 he helped his mother, Violet, open a small retail greenhouse business selling begonias, gloxinias, fall bulbs, and lilies to bring in additional income for the family. Woodriff was in charge of growing lilies from seed. When a doctor ordered Violet to a lower altitude for a heart condition, the family sold their cattle, moved to Oregon, and eventually began focusing on producing lilies there.

Though family finances prohibited him from going to college, Woodriff managed the family business and helped send his two brothers through school. During a brief

stay in Los Angeles, Woodriff met his wife Ruth, the daughter of a landscape gardener. They were married in 1930 and joined Woodriff's parents in the lily business. In 1970 a large bulb distributing corporation lured Woodriff, Ruth, and two of their five children from Oregon to McKinleyville. But within eight months the deal went sour and the corporation legally retained most of the breeding material on the premises—including the original bulbs of 'Star Gazer', worth far more than anyone could have imagined at the time. From out of those ashes rose Fairyland Begonia and Lily Garden, where Woodriff can be visited today, working with his daughter, business partner, and fellow hybridizer Winkey.

Though Woodriff's eyes have grown weak and he must use a walker to move around Fairyland, his work has been little affected. He still makes crosses daily, looking for a lily that can be forced in fifty days, polyploid lilies with heavier substance, and wide crosses between orientals and Asiatics.

Clearly, the life of a breeder is not always financially rewarding. "The satisfaction is to see your hybrids go around the world," says Woodriff. "Sure, there's money to be made in developing new hybrids, but it can cost hundreds to patent one. Then you have to 'police it,'" he continues with disdain. "None of my lilies are patented. I'm interested in making things popular. I'm satisfied with opening a few doors."

**A** cres of trialing fields and mass hybridization programs are of little value to award-winning breeder LeVern Freimann, who has pursued his lily breeding avocation for over sixty years in small garden plots around his homes in Bellingham, Washington. "I've always worked on the wide crosses," Freimann explains. "Usually with those crosses you get a minimum of seed, if any. So large trialing grounds were never a necessity in my breeding program." Freimann has become well known as one of the first breeders to produce readily hybridized, tetraploid lily clones of sterile or hard-to-cross diploid lily hybrids. His first diploid subject was Woodriff's popular oriental hybrid 'Black Beauty'. Although the lily was disease resistant, highly adaptable, and elegant in flower, it refused to set seed, which meant of course that its characteristics could not be passed on to other hybrids. To make it fertile, Freimann needed colchicine, the highly poisonous alkaloid



COURTESY OF LEVERN FREIMANN





LeVern Freimann was a pioneer in tetraploid lilies, including 'Scarlett Delight', above.

obtained from the autumn crocus (*Colchicum*) that will double plant cell chromosome numbers during division. But it was in high demand for medicinal uses, difficult to obtain, and expensive at the time. So Freimann improvised. He procured a batch of autumn crocus bulbs, ground them into a paste in a meat grinder, and soaked his lily bulb scales in it. Homemade but potent, his crocus paste worked and a fertile, tetraploid 'Black Beauty' was created. Its fertility opened new doors for breeders worldwide—including Freimann himself. Crossing his tetra 'Black Beauty' with another tetraploid oriental, 'Journey's End', Freimann produced the vigorous 'Scarlett Delight', a strong, attractive lily with the heavy petal substance characteristic of its tetraploid lineage.

Freimann went on to create tetraploid Asiatics as well, including 'Apricot Supreme'. Apricot colored with large brown-black spots, it netted him the lily society's S. L. Emsweller Trophy for the best new hybrid of polyploid breeding and the Earl Hornback Award for the lily showing the greatest advance in hybridization.

Though Freimann persists in calling himself a lily breeding "hobbyist," he is a well-educated plantsman. Born in Iowa in 1901, he moved to Selah, Washington, with his family as a child, graduated from Washington State University in 1928 with an agriculture degree, and was then assigned to Bellingham as an extension agent. In 1928 a custodian at the federal building housing the extension offices showed Freimann a large, native Burmese *Lilium sulphureum* bulb he had purchased. "When I saw the beauty of that plant I was determined to get one even at the asking price of \$3.50—a price unheard of in those days when you could buy a common lily bulb at the dime store for 10 cents." He ordered the bulb from New York, planted it, and, he recalls, "I thought it had the most beautiful flowers I had ever seen. The stalk grew to about six feet and had fourteen or fifteen flowers.

"I had taken two courses in plant breeding at college," he continues, "and couldn't help but wonder what the Burmese lily could do in hybridization. At that time lilies were just coming on to the market. Though many species were available, not much had been done in hybridizing. So I thought, here is an opportunity to do a little pioneering with a flower that hasn't been worked on extensively." Freimann continued acquiring bulbs and dabbling in

hybridizing on his off hours.

After retiring from extension work in 1966, Freimann continued working with his lilies, vegetable garden, and orchard, until his one-acre homesite became too difficult to maintain. In 1989 he and his wife Marion moved to a retirement community in Bellingham where Freimann has a large front bed in which to continue his work—ample space for his "less is better" hybridizing style.

Marion died recently, but Freimann, now 91, is as energetic as any new ag school graduate when it comes to his current hybridizing project. "It's always been my goal to produce lilies as hardy as a common daffodil, specifically to produce an *auratum* hybrid as tough as 'Black Beauty', and I'm reaching nearer that goal every season. I've found a lily—one I think I would've given anything to have found twenty years ago." Purchased from Woodriff, the plant was supposed to be a species but is probably a *L. auratum* hybrid. Whatever its identity, it will cross "with most any hybrid I have—odd varieties I never would've thought would work! The potential for reaching my goal is great, but at my age, in the sunset of my life, I've arrived at a point where I don't know if I'll personally be able to do it.

"Others are working on it, though," says Freimann, brightening, "and will no doubt succeed."

B & D Lilies purchased much of Freimann's stock when he recently made the move from his home to an apartment. Co-owner Bob Gibson indicates there are treasures among the stock when he says, "We're keeping close tabs on the material, propagating it carefully and keeping it in plots separate from our other lilies." Future Freimann lily hybrid introductions will no doubt come from the material.

Even with Freimann's award-winning lilies on the market, Gibson attests, "Breeders tend to receive little recognition in the industry at large for their work. They're kind of like fine painters. It'll be years before the gardening world fully recognizes the contribution Freimann made in his breeding breakthroughs." The city of Bellingham will be ahead of the rest of the world. This past summer, it began planning the LeVern Freimann Lily Garden, to feature all of his hybrids.

Freimann says he wouldn't change much about his 90-plus years. His advice to those younger? "Everyone should have a hobby. Hybridize *Continued on page 37*

# Drip Rationale

*There's a scientific explanation for its effectiveness.*

The phrase "drip irrigation" all too often is synonymous only with western gardens and the dreaded "D" word—drought. While it's no surprise that drip irrigation helps gardens flourish during torrid droughts in arid climates, drip irrigation is much more than a last-ditch strategy for a parched landscape—it's a way to help *all* American gardens prosper. Even when it rains periodically throughout the summer, gardens with well-designed drip systems display more plentiful foliage growth, a tangible increase in bloom, higher vegetable and tree crop yields, and a marked reduction in diseases such as mildew, crown rot, and rust. And drip irrigation does all this while saving 30 to 70 percent of the water supply. As an additional bonus, the gardener has more leisure time (or time for other gardening tasks) due to the elimination of time-consuming watering by hand.

Drip irrigation technology originated in Israel during the early 1960s and gets its name from the action of the emitters—small devices that limit the flow of water to tiny droplets that slowly moisten the ground without flooding. Drip emitters release water very slowly and form a wet spot beneath the soil's surface. Pictured vertically, this moist area is shaped differently in different types of soil, ranging from a long, carrotlike shape in sandy soil to a squat, beetlike shape in heavy clay soils.

It's easy to understand how drip irrigation benefits climates with four- to six-month summer droughts. But consider just a few examples of the efficacy of drip irrigation in humid, summer-rain climates. Art Gaus, an extension horticulture specialist with the University of Missouri-Columbia, has had a drip system in his home garden for more than nine years. In the summer of 1986, his bush watermelons with plastic mulch and a drip system produced thirty-two pounds in a four-foot-by-four-foot area, compared to an average of nine to sixteen pounds produced in the same space with conventional irrigation. He estimates a well-timed drip system "could mean a 100 percent increase in yields; during the droughts of 1980, '83, and '84 it meant the difference between having a crop or no crop at all." In a study of established pecan trees in Georgia, trees with supplemental drip irrigation showed a 51 percent increase in yields. Michigan State University has documented a 30 percent yield increase in vegetable crops with drip irrigation, even with sporadic summer rains.

B Y R O B E R T K O U R I K

To understand why drip irrigation promotes luxurious growth, you'll need to take a fresh look at how roots absorb moisture and nutrients and how plants respond to wet and dry periods in an irrigation cycle. Many landscape gardening books recommend deep waterings on an infrequent basis—in dry climates, every couple of weeks or even once a month. This "ancient wisdom" obviously hasn't killed every tree or shrub, because millions of people continue to follow this advice. But recent research shows this approach to watering does *not* promote maximum growth.

While deep irrigations are useful for the survival of trees during times of extreme drought, this watering regime is far from ideal for both the quality and quantity of foliage. Studies have shown that the healthiest trees, with the biggest canopies and greatest productivity, are those that receive more frequent, regular, and shallower irrigations. Infrequent irrigations also pro-



duce the lowest growth and reduced yields of fruits, nuts, and vegetables. There is a biological explanation for these phenomena.

The upper layers of the soil are the most aerobic, with the highest population of air-loving bacteria and soil flora. The top three inches of the soil have nearly four-and-a-half times more bacteria, almost eight-and-a-half times more actinomycetes (organisms midway between bacteria and fungi that give soil its earthy odor), more than two times as many fungi, and five times the algae of the eight- to ten-inch zone. These valuable decomposers are nature's fertilizing machines and must have plenty of oxygen to fuel their activity. It

*Above: Drip irrigation promotes growth that is uniform and luxurious. Right: Technophobes take comfort. The right design will render the much-dreaded hardware of a drip system nearly invisible.*



PHOTOS BY ROBERT KOURIK

## THE BENEFITS OF DRIP IRRIGATION

- ☞ *Uses water efficiently.* Sprinklers waste water as a result of wind, evaporation, runoff, or deep leaching.
- ☞ *Provides precise water control.* Every part of a drip irrigation system is constructed with an exact flow rate so you can control the amount down to the ounce.
- ☞ *Increases yields.* Drip irrigation easily maintains an ideal soil moisture level, promoting more abundant foliage, greater bloom, and higher yields than all other methods of irrigation.
- ☞ *Provides better control of saline water.* Saline water applied to a plant's foliage can cause leaf burn. Also, frequent use of drip irrigation helps to keep the salts in solution in the soil so they don't affect the roots adversely.
- ☞ *Improves fertilization.* A fertilizer injector (or proportioner) can easily apply dissolved or liquid fertilizers without leaching the fertilizer beyond desired root zones.
- ☞ *Encourages fewer weeds in dry-summer climates.* The emitters make only a small moist spot while the larger dry areas between emitters remain too dry in dry-summer climates for weed seeds to sprout.
- ☞ *Saves time and labor.* Drip irrigation systems eliminate tedious and inefficient hand watering, especially with automated systems.
- ☞ *Reduces disease problems.* Plants are less likely to develop sprinkler-stimulated diseases such as powdery mildew, leaf spot, anthracnose, crown rot, shothole fungus, fireblight, and scab.
- ☞ *Provides better water distribution on slopes.* Drip emitters apply the water slowly enough to allow all the moisture to soak in, regardless of slope.
- ☞ *Promotes better soil structure.* Drip-applied water gradually soaks into the ground and maintains a healthy aerobic soil that retains its loamy structure.
- ☞ *Conserves energy.* The low pressure of a drip irrigation system means lower pumping costs with municipal and private water supplies.
- ☞ *Uses low flow rates.* Drip emitters can water larger areas than sprinkler systems with the same amount of water.
- ☞ *Is more economical than permanent sprinkler systems.* Drip irrigation systems usually cost less than underground sprinkler systems.

## THE LIMITATIONS OF DRIP IRRIGATION

- ☞ *Eliminates soothing hand-watering.* For some, the act of hand watering is more valuable than therapy or meditation and drip irrigation is counterproductive.
- ☞ *Initial costs are high.* A simple oscillating sprinkler will always be cheaper than even the least expensive drip irrigation system.
- ☞ *Can clog.* Many early models of emitters were more prone to clogging and gave the industry a bad reputation. With the correct modern emitter, clogging is no longer a serious problem.
- ☞ *May restrict root development.* With only one or two emitters per plant, root growth can be greatly restricted. With the proper placement of emitters, root growth will be uniform, expansive, and healthy.
- ☞ *Rodents can perforate the tubing.* Gophers are likely to chew on the drip hose for a drink. Occasionally even mice and wood rats will chew through the hose.
- ☞ *Isn't compatible with green manures and cover crops.* The growth of a green manure crop gets all tangled up with the drip tubing, thus prohibiting the usual tilling-under of plants.
- ☞ *Weeding can be difficult.* Care must be taken not to damage an exposed drip system while weeding. (Mulch can mitigate this problem.)
- ☞ *Requires greater maintenance.* Drip irrigation requires more routine maintenance than a hose or sprinkler to sustain its high level of efficiency, but it's relatively simple.
- ☞ *Doesn't cleanse the foliage.* Plants with leaves that require an occasional sprinkling should be watered with low-flow sprinklers.
- ☞ *Doesn't create humidity.* Humidity-loving plants prefer misters and sprinklers.
- ☞ *You can't see the system working.* With a well-mulched drip system, the emitters quietly go about their work hidden from view. For some, this is the beauty of the system. For others, not being able to watch the watering is unsettling. —Robert Kourik

is mostly these bacteria and flora that are responsible for the liberation of mineralized—and therefore unavailable—nutrients into a soluble form that the plant can absorb. The soil life stimulates the production and renewal of humus, which releases much of the nutrients plants utilize. Thus, the upper, aerobic horizon of the soil is where the greatest amount of nutrients is liberated.

Plants absorb these nutrients primarily in a soil-water solution. In all the studies I've found over the past ten years, the usual conclusion is that, for the sake of quality growth, as opposed to sheer survival, the upper one or two feet of the soil account for more than 50 percent of all the water a plant absorbs. While many plants have roots deeper than two feet, these deeper roots exist mostly to stabilize the plant, absorb some micronutrients, and help the plant survive droughts rather than to support an abundance of growth.

If the upper layers of soil are too dry, then nutrient uptake is inhibited because the soil life can't thrive. Allowing the upper soil to dry out between infrequent irrigations means that nutrient uptake also "dries up" during this period. Then, when plenty of water is supplied all at once, the soil is saturated to the point that roots and air-loving soil life may be stressed or killed from *too much* water—nutrient uptake is inhibited by the lack of air that normally sustains the humus-producing bacteria and supports active root hairs. It also takes some time for the air-loving soil bacteria to repopulate either the too-wet or too-dry soil, so there is a biological lag of hours, days, or weeks before the roots get their best meals. Infrequent and deep irrigations tend to produce two extremes in the watering cycle where the soil life is damaged enough to reduce or prevent growth.

I like to think of frequent irrigations as "topping off the tank." Starting with an ideal soil moisture, not too anaerobically wet and not too dry, the goal is to replace, as often as every day, exactly the amount of moisture lost due to evaporation from the soil and transpiration from the plant's leaves (called the ET rate, for evapotranspiration), plus an amount that represents enough extra water for higher yields or more gorgeous foliage. In climates with sporadic summer rains, this means turning the drip system on only when the rains are too far apart to maintain proper soil moisture. In arid summer areas, the drip system is used on a regular basis to sustain an ideal

WATER USE AT VARIOUS DEPTHS, IN PERCENTAGE PER FOOT

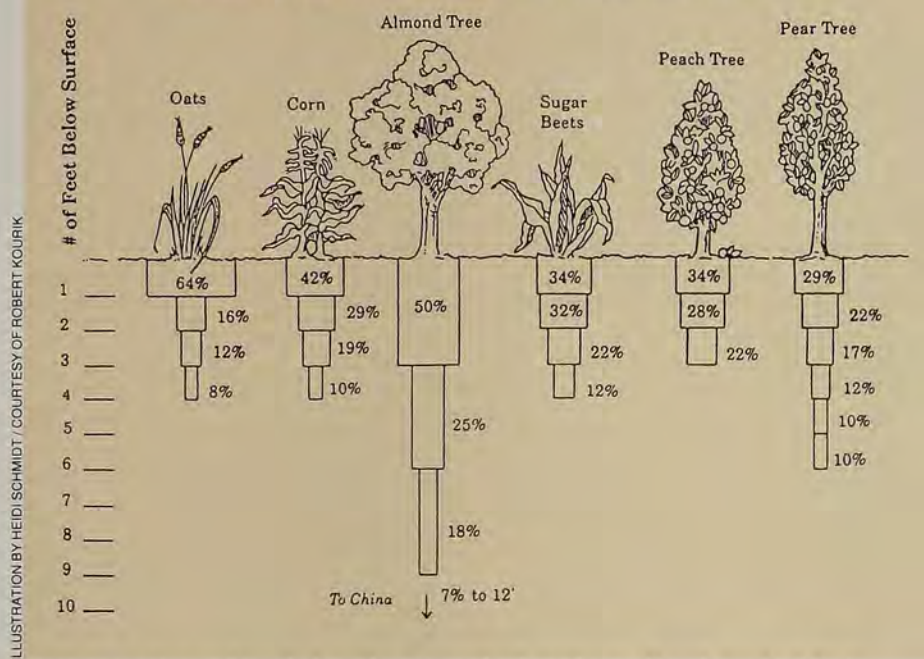


ILLUSTRATION BY HEIDI SCHMIDT / COURTESY OF ROBERT KOURIK

*Drip irrigation is founded on the principle that plants absorb most of their water and nutrients from the upper one to two feet of the soil.*

soil moisture level. Daily irrigation, with minute amounts of water, will produce the greatest effect—whether your goal is foliage, caliper, bloom, or yields.

From *Arboriculture* by Richard W. Harris, we read: “In contrast to other systems, drip irrigation must be frequent; waterings should occur daily or every two days during the main growing season . . . the amount of water applied should equal water lost through evapotranspiration.” This doesn’t mean you’ll be wasting tons of extra water. Often it means just applying the same amount of water on a monthly basis, but in a very different pattern of application.

Sometimes, daily irrigation can actually use less water per month than other methods. For example, I planted a drought-resistant garden for a neighbor with plants such as lavender, santolina, rock roses, and rosemary. After the risk of transplant shock was over, the irrigation line was turned on each day for only eight minutes. While the system came on daily, each emitter in the line passed only one-half gallon of water per hour (gph). This means that each emitter was distributing the paltry amount of eight ounces of water per emitter, per day. Since the entire line has 400 emitters, capable of passing 200 gph, the line only uses twenty-five gallons per day—for over 600 square feet of landscaping. By contrast, a garden near my neighbor’s, and in a similar soil, is arbitrarily irrigated twice a month for four hours with one-half gph emitters. This amounts to as much as

two gallons per emitter for each two-week period or equal to over eighteen ounces per day—more than twice the water applied in daily doses to my neighbor’s garden.

The plumbing required for drip irrigation systems is well within the means and skills of most gardeners. Whatever mistakes you make in plumbing a drip system are easily rectified and virtually harmless—providing you correctly install a backflow preventer to protect the purity of your home’s drinking water. If you’re intimidated by any device more complicated than a hand-operated can opener, rest assured that drip irrigation is nowhere near as bad as it seems. Think of all those put-’em-together parts as toys for grown-ups. Harken back to the bygone days of childhood, when you whiled away many happy hours with Lincoln Logs, Erector Sets, or Tinker Toys. If you can put yourself in that same carefree, playful frame of mind when out in your landscape, then drip parts may not seem so intimidating. After you’ve installed a drip system, your garden will reward you with an abundance of bloom, productivity, and foliage.

*Robert Kourik is the author of Designing and Maintaining Your Edible Landscape—Naturally and Gray Water Use in the Landscape. This article is excerpted from his most recent book, Drip Irrigation for Every Landscape and All Climates, available from the AHS Book Program. See the order form on page 11.*

*Lily Breeders Continued from page 33*

plants if it will increase your interest in life,” says Freimann. “I think anybody who has a hobby has a better chance of living longer.”

McRae, Woodriff, and Freimann are among a special breed of hybridizers who collectively created a golden era of lily breeding in America for most of the twentieth century. All three readily admit that Dutch hybridizers have taken the global lead in sheer volume of new lily hybrids. Holland has also moved forward aggressively into high-tech research and production methods, including using recombinant DNA procedures for increasing lily disease resistance.

Though the United States boasts many lily breeders, most would be classified as amateurs, working on a small scale sans a monied sponsor. Yet if Freimann’s accomplishments are representative of “amateur” contributions to American lily breeding, perhaps the golden age is not yet over.

*Melissa Dodd Eskilson is a free-lance writer who grows lilies in Topeka, Kansas.*

SOURCES

Lily hybrids produced by the three featured breeders can be found in gardening catalogs and nurseries around the world. The following sources, which also offer lilies mentioned in the “Proven Performers” article, are simply a sample of suppliers:

- B & D Lilies, 330 “P” Street, Port Townsend, WA 98368, (206) 385-1738. Catalog \$3. LeVern Freimann hybrids.
- Borbeleta Gardens, 15980 Canby Avenue, Faribault, MN 55021, (507) 334-2807. Catalog \$3.
- Fairyland Begonia and Lily Garden, 1100 Griffith Road, McKinleyville, CA 95521, (707) 839-3034. List 50 cents. Leslie Woodriff hybrids.
- Hartle-Gilman Lilies, Rural Route 4, Box 14, Owatonna, MN 55060, (507) 451-2170. Catalog free.
- Lilies and More, 12400 N.E. 42nd Avenue, Vancouver, WA 98686, (206) 573-4696. Catalog \$1.
- Mt. Hood Lilies, P.O. Box 1314, Sandy, OR 97055. Catalog \$2.50.
- Ozark Mountain Lilies, P.O. Box 306, Mansfield, MO 65704. Catalog free.
- Park Seed Company, Cokesbury Road, Greenwood, SC 29647-0001. Catalog free. Edward A. McRae hybrids.

# A Defense of Ailanthus

*In ravaged urban sites, few trees are more tenacious than the “stinking ash.”*

B Y R I C H A R D P E I G L E R

In her 1943 novel, *A Tree Grows in Brooklyn*, Betty Smith wrote of the *Ailanthus altissima* that its branches “look like a lot of green opened umbrellas.” No matter where its seed falls, she wrote, “it makes a tree which struggles to reach the sky. It grows in boarded up lots and out of neglected rubbish heaps. It is the only tree that grows out of cement. It would be considered beautiful except that there are too many of it.”

Smith considered the “Brooklyn palm” a symbol of endurance and strength that would thrive in spite of adversity. But while the tree was deliberately introduced into cultivation throughout much of the temperate regions of the world during the eighteenth and nineteenth centuries, it is now rarely planted intentionally, at least in Europe and North America. I have never found it for sale in garden centers or tree

nurseries. It has received the botanical kiss of death: it is a “weed tree.”

Most written descriptions note that the male trees bear “putrid” or “vile” flowers, and “stinking ash” is among its common names. An 1875 law passed by the District of Columbia, citing this “offensive and noxious odor,” declared the trees “nuisances injurious to health” and harboring them a crime. Property owners who failed to remove an *Ailanthus* could be fined up to \$10. As late as five years ago, the law was still on the books. Some authors also mention the male’s copious production of pollen, to the distress of allergy sufferers.

Yet elsewhere, and at other times, it has

*The tree that grew in Brooklyn can take the harsh conditions of any city. It seems actually to prefer poor, disturbed soil.*



RICK WICKER / DENVER MUSEUM OF NATURAL HISTORY



been held in much higher repute. In its native China, where it is called *chhu*, the tree is valued as an ornamental and has been deliberately planted on the streets of Beijing. Its wood, while lightweight and weak, is used for carts. The seeds are a source of cooking oil and the bark is used for tannin. And it serves as a food source for a species of wild silkworm, which produces silk in that country and India. In the 1860s this big saturniid moth, known as the ailanthus silkmoth or cynthia moth (*Samia cynthia*), was introduced and became established in Paris and Vienna as well as in Philadelphia, New York, and other eastern U.S. cities. The intended silk industry never became profitable in North America or Europe, of course, and the U.S. populations of the moth have declined dramatically in recent years.

Various sources report the tree being cultivated in New Zealand, southern Australia, and southern Africa. *Ailanthus* is used to control erosion around the Black Sea and in the mountains of Morocco, and is the most commonly planted tree in greenbelts in Iran.

*Ailanthus* is used in traditional Chinese medicine today as it has been for centuries to treat dysentery and intestinal hemorrhage. In *A Field Guide to Medicinal Plants*, Steven Foster and James Duke note that an infusion of the bark has been used to treat tapeworm, leukorrhea, and diarrhea. More recently it was discovered that *Ailanthus* contains at least three compounds that are effective against malaria.

It would seem that the Germans extolled the tree, which they called *Götterbaum*, or "tree of the gods." However, the tree's common name no doubt refers not to a divine appearance, but to its fast growth. The tree's genus name comes from *aylanto*, the native name for another species, *A. moluccana*, found in the Molucca Islands of far eastern Indonesia. G. E. Rumph or "Rumphius," a merchant who studied natural history there in the seventeenth century, translated this word, meaning "reached to heaven," as *arbor caeli*, or tree-of-heaven. The species name, meaning "highest," repeats the theme.

Yet in a stark urban landscape, the tree can in fact seem almost unearthly in both appearance and tenacity. The slender, unbranched trunks of saplings crowned with long compound leaves create the illusion of coconut palms on a tropical beach. These leaves, which led to its comparison with the ash, have given it another common name,

Chinese sumac. The leaves can be more than two feet long, divided into eleven to forty leaflets, each of which has a highly visible pair of warty glands. The huge leaves are well-supported by the tree's branches, which on saplings can quickly become as thick as broom handles. Some European gardeners cut them to the ground each season, which results in even larger, more exotic leaves, whose effect in a border was compared by one author to that of "some ferocious fern."

Whether or not you find the musty male flowers unpleasant, it should be noted that they bloom for only about two weeks each year. The flowers of the female are negligible, but their rosy red seeds appear in masses in late summer, giving color effects as fine as many flowers. These seeds persist through the winter, changing from a rich brown to a bleached beige as they fade in the winter sun, adding relief from all the bare trees around them. These are technically samaras, a type of winged fruit. But unlike the more familiar ones of the maple and ash, which spin like helicopter blades as they fall, the *Ailanthus* seed is twisted so that an individual samara will twirl lengthwise as it tumbles through the air.

On top of all these aesthetic attributes, and probably the strongest argument in the tree's favor, is the fact that the *Ailanthus* is highly tolerant of city pollution, having thrived in the smoke and grime permeating the air of the big industrialized cities from the time when air pollution was an accepted norm. It tolerates a lot of salt in its soil, a decided advantage where roads with snow and ice are routinely salted. *Ailanthus* seedlings and suckers emerged to thrive from underneath bomb debris in Europe after World War II.

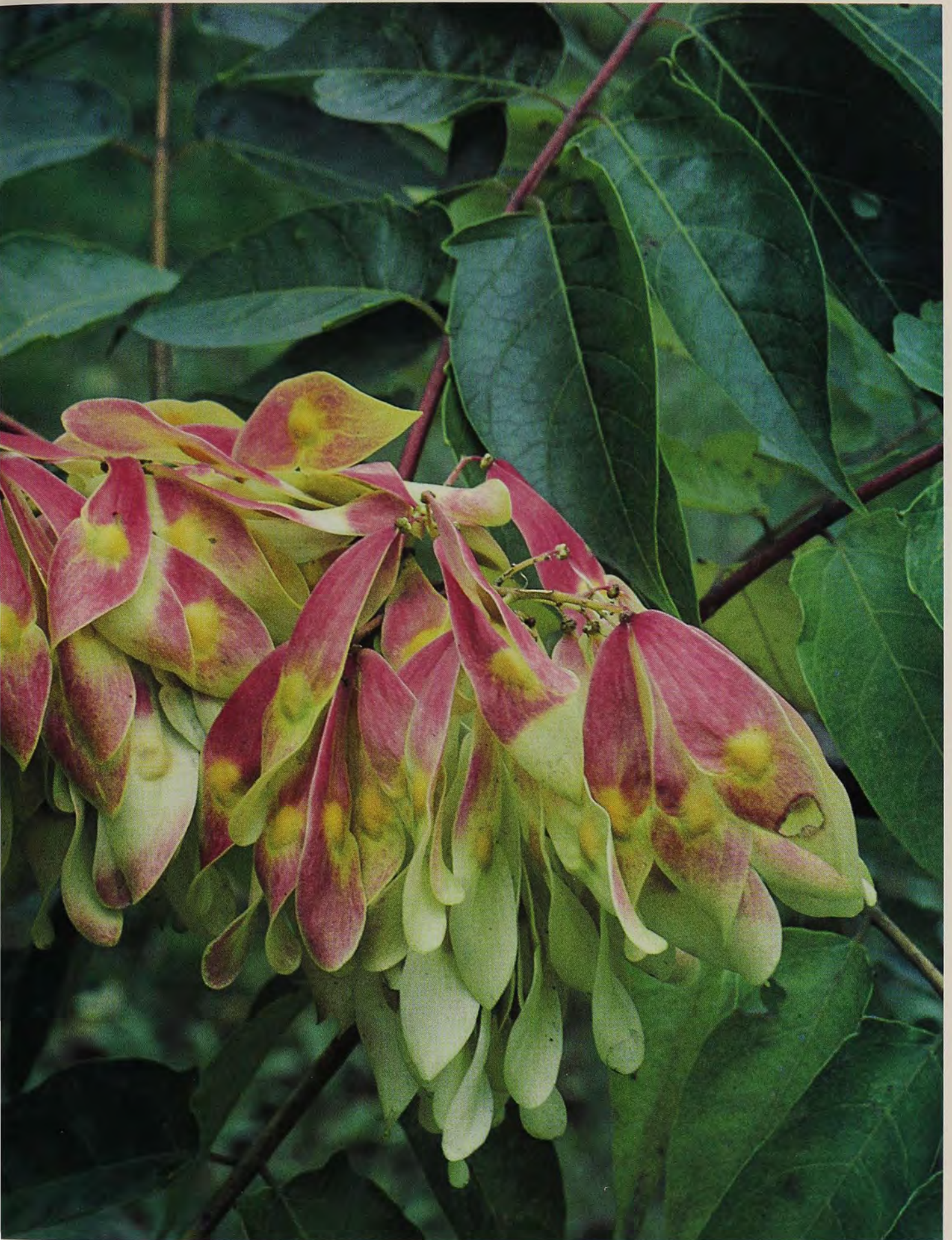
The tree is also fast growing. One source I consulted claims that the young trees can grow almost ten feet per season. That may be true in the South, but certainly not in Denver. Three to five feet is probably more typical for the average-length season. Scientists at the Urban Horticulture Institute of Cornell University discovered that an *Ailanthus* seedling develops a very extensive root system composed of thick, far-reaching roots early in its development. These roots would explain why the tree can thrive amid so much concrete or asphalt. In fact, the tree seems to prefer a disturbed

*The female tree-of-heaven bears none of the male tree's "vile" flowers, but is covered in late summer with rosy red seeds.*



MICHAELS THOMPSON





habitat. It is uncommon, or even absent, in the country, and the Cornell team found that while a Norway maple could outcompete an *Ailanthus* when both were planted in rich soil, the opposite was true in poor soil.

Just as many contemporary horticulturists don't agree about the worth of this tree—whether it is in the words of one author “arboreal ruffraff or ultimate tree”—early botanists had trouble classifying it. It is a member of the quassia family (Simaroubaceae), which has no native representatives in Europe or North America except for a few in southern Florida and western Mexico. In 1786 English botanist Philip Miller, growing it from seed at Chelsea Gardens, called it *Toxicodendron altissimum*, putting it in the same genus as poison sumac. In 1788 Parisian René Louiche Desfontaines, unaware of Miller's earlier published description, renamed the species *Ailanthus glandulosa*, in recognition of the warty glands on its leaves.

Seeds of the tree had been sent to Paris from Beijing in 1751 by a Jesuit missionary named Pierre Nicolas le Chéron d'Incarville (1706-1757). He was sent to China with the charge of converting the emperor to Christianity. One story says that d'Incarville gained favor with the emperor by presenting him with living specimens of the sensitive plant (*Mimosa pudica*), and the two agreed to exchange European plants for Chinese plants. D'Incarville is also credited with the introduction to the West of golden-rain tree (*Koelreuteria paniculata*), arborvitae (*Thuja orientalis*), and Chinese aster. Even he seemed to have some ambivalence toward the tree, since it appears that he was the first to call it *frêne puant*, or stinking ash.

His first two consignments of plants from China met with disaster. The first was captured at sea by the British and the second was shipwrecked. The *Ailanthus* seeds that finally reached Europe presumably traveled by an overland caravan. These were soon successfully raised in England and France.

In 1784 the tree was introduced from England to what is now the United States, where it was first planted around Philadelphia. In 1820 a nurseryman on Long Island propagated and sold this tree on a large scale and it was planted extensively in Brooklyn and other sections of New York City. Later in that century, Chinese miners brought the tree from China to California. One of the largest specimens I have ever seen grows in Salt Lake City on a corner of



PHOTOS BY RICK WICKER / DENVER MUSEUM OF NATURAL HISTORY



**Above:** Unlike the “helicopter” samaras of the maple, the seeds of *Ailanthus* are twisted and will twirl corkscrew fashion as they fall.  
**Left:** A century ago, District of Columbia officials declared it a crime to harbor the male tree-of-heaven because they found the odor of its flowers so noxious.

Temple Square, an appropriate site for a tree-of-heaven. Historically, *Ailanthus* has been widely planted in the eastern United States, but then began to fall out of favor, much as did two other fast-growing Chinese introductions to our Southeast—the chinaberry (*Melia azedarach*) and the paper mulberry (*Broussonetia papyrifera*).

In the case of *Ailanthus*, the recommendation that is usually made is to plant only female trees. (In some ways, I prefer the males, which retain lush leaves while the females exhaust their energies making fruits.) Unfortunately, the sex of a tree cannot be practically determined until it is large enough to flower, which takes approximately a decade here in Denver. And in the case of the poor beleaguered stinking ash, it is unlikely that any nursery is going to coddle a seed-grown tree along until it reaches this mature age.

Nurseries could build a reliable stock of

female *Ailanthus* by propagating them from rootstock. Breeders could select trees that have fewer objectionable qualities. Although three named cultivars have been developed—one of them a male, interestingly—they are almost unobtainable.

Yet a market-savvy nursery might be well-advised to promote the fast-growing, drought- and pollution-resistant tree-of-heaven for use as a highway or street tree. It's worth noting that the most common street tree in Colorado is the honeylocust (*Gleditsia triacanthos*), a species that was deemed objectionable due to dangerous spines and messy seed pods until spineless and sterile cultivars were available.

In addition to its other qualities, the *Ailanthus* is virtually pest-free. *Verticillium* wilt is the tree's most damaging enemy and even this rarely does great harm. Shoe-string root rot is an occasional problem. The U.S. population of the cynthia moth

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has fallen too sharply for it to be a threat. Outside of Florida, the tree is exclusive host to the caterpillar of a tiny North American moth, the ailanthus webworm (*Atteva punctella*). While it sometimes causes defoliation, the moth is an attractive one, checkered with black, white, and orange. Of interest to entomologists is that the introduction of the tree appears to have greatly increased the moth's original range from Florida, where it feeds on the paradise tree (*Simarouba glauca*), another member of the quassia family.

Hybridization could conceivably be an answer to improving the *Ailanthus* image. But while there are about a dozen species of *Ailanthus*, which range from northern China to southern India and down through Indonesia to New Guinea, the most appealing would not be hardy in much of the United States. *A. excelsa* is a beautiful and majestic tree of the Himalayas, where natives call it *barkesseru* or *maharukh*. The barpat (*A. grandis*) grows in warmer climates of sub-Himalayan regions across to southeastern China. I obtained seeds of these two species and find that the seeds of *A. excelsa*, like the tree itself, look much like *A. altissima*, but the samaras of *A. grandis* are comparatively huge and the plants also look quite different. The barpat is used in India as a forestry tree. Its rapid growth provides a high yield of wood, used for box planking, matches, and newspaper pulp. Since neither of these species will withstand Denver winters, I grow them indoors much of the year. I have made herbarium specimens from some of the seedlings and I plan to offer some live plants to horticulturists in the Gulf States.

As with many other trees whose natural distribution is now limited to eastern Asia and/or eastern North America, fossil records show that *Ailanthus* grew in western North America, Europe, and western Asia during much of the Tertiary period, from 70 to 10 million years ago. Fossil impressions of leaves and samaras have been collected at many sites in these regions, where a gradual cooling and drying of the climate, culminating in Ice Age glaciation, caused the tree to become extinct. But now that humans have reintroduced the tree-of-heaven into these regions, it appears that the ailanthus is back. Whether it is with a vengeance, or with a purpose, is still up to us to decide.

Richard Peigler is an entomologist at the Denver Museum of Natural History.

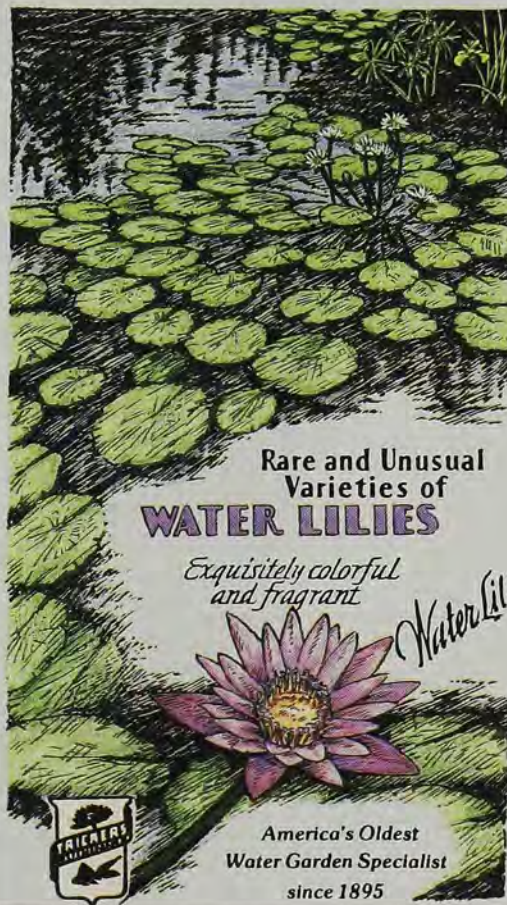
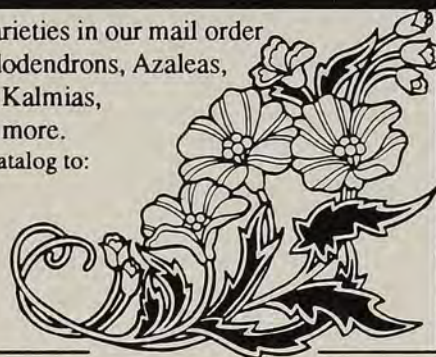
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# PRONUNCIATIONS

*Acer pseudoplatanus* AY-ser soo-doe-plat-AY-nus  
*Ailanthus altissima* ay-LAN-thus al-TIH-sih-muh  
*A. excelsa* A. ek-SEL-suh  
*A. glandulosa* A. gland-yew-LOW-suh  
*A. grandis* A. GRAN-diss  
*A. moluccana* A. mol-uh-KAN-uh  
*Broussonetia papyrifera*  
 brew-son-NET-ee-yuh pap-ih-RIH-fer-uh  
*Campanula rotundifolia* kam-pan-YEW-luh  
 roe-tund-ih-FOE-lee-uh  
*Colchicum* KOAL-chih-kum  
*Convallaria* kon-val-LAY-ree-uh  
*Dianthus* × *allwoodii* die-AN-thus × all-WOOD-ee-eye  
*D. arenarius* D. ar-ee-NAY-ree-us  
*D. barbatus* D. bar-BAY-tus  
*D. caesius* D. SEE-zee-us  
*D. caryophyllus* D. kair-ee-oh-FIL-lus  
*D. chinensis* D. chy-NEN-sis  
*D. deltoides* D. del-TOY-deez  
*D. gratianopolitanus* D. grat-see-ay-no-pol-ih-TAY-nus  
*D. knappii* D. NAP-ee-eye  
*D. plumarius* D. ploo-MAIR-ee-us  
*D. superbus* D. soo-PER-bus

*Episcia* ee-PISS-ee-uh  
*Erythronium* air-ih-THROW-nee-um  
*Ficus sycomorus* FIE-kus sih-koh-MORE-us  
*Foeniculum vulgare* fee-NICK-yew-lum vul-GAY-ree  
*Gleditsia triacanthos* gleh-DIT-see-uh try-uh-CAN-thos  
*Hemerocallis* hem-er-oh-KAL-liss  
*Hymenocallis* high-men-oh-KAL-liss  
*Kalopanax pictum* kal-oh-PAN-aks PIK-tus  
*Koeleria paniculata* kel-roo-TEE-ree-uh  
 pan-ik-yew-LAH-tuh  
*Lilium auratum* LIL-ee-um ar-AY-tum  
*L. candidum* L. KAN-dih-dum  
*L. × dalhansonii* L. × dal-han-SOWN-ee-eye  
*L. formosanum* L. for-moh-SAY-num  
*L. hansonii* L. han-SOWN-ee-eye  
*L. henryi* L. HEN-ree-eye  
*L. iridollae* L. eye-rih-DOLE-ee  
*L. lancifolium* L. lan-sih-FOE-lee-um  
*L. longiflorum* L. lon-jih-FLOR-um  
*L. martagon* L. MAR-tah-gon  
*L. pardalinum* L. par-dah-LIE-num  
*L. pitkinense* L. pit-kih-NEN-see  
*L. regale* L. ree-GAL-ee

*L. speciosum* L. spee-see-OH-sum  
*L. sulphureum* L. sul-FEW-ree-um  
*L. × testaceum* L. × tes-TAY-see-um  
*L. tigrinum* L. tih-GRY-num  
*L. vollmeri* L. VOL-mair-eye  
*Linum perenne* LIE-num per-EN-ee  
*L. rubrum* L. ROO-brum  
*Magnolia grandiflora* mag-NOH-lee-uh  
 gran-dih-FLOR-uh  
*Melia azedarach* MEE-lee-uh ah-ZED-eh-rak  
*Mimosa pudica* mih-MOH-suh PEW-dih-kuh  
*Platanus occidentalis* PLAT-uh-nus  
 ahk-sih-den-TAL-iss  
*Morus* MOH-rus  
*Rudbeckia* rood-BEK-ee-uh  
*Saintpaulia grotei* saint-PAUL-ee-uh GROW-tee-eye  
*S. inconspicua* S. in-kon-SPICK-yew-uh  
*S. ionantha* S. eye-oh-NAN-thuh  
*S. magungensis* S. mag-ung-GEN-sis  
*Simarouba glauca* sim-ah-ROO-buh GLAW-kuh  
*Thuja orientalis* THEW-yuh oh-ree-en-TAL-iss  
*Toxicodendron altissimum* tok-sih-koh-DEN-dron  
 al-TIH-sih-mum

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The Second Edition of *North American Horticulture: A Reference Guide*, edited by Thomas

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### MARCH 16-29, 1993 NATURAL GARDENS OF PANAMA AND COSTA RICA

Our voyage on board the *MV Yorktown Clipper* begins in Panama, ends in Costa Rica, and offers daylight transit of the Panama Canal. The horticultural treasures of Costa Rica are revered by botanists the world over and one of the program's many highlights is an excursion from San José to Cartago to visit Linda Vista, the creation of Claude Hope. If you have ever planted petunias or impatiens in your garden, the seed most likely came from Linda Vista. Claude Hope was the 1992 recipient of the American Horticultural Society's Liberty Hyde Bailey Award, given for outstanding service to horticulture. Leading this program is former AHS Board Member Roy Thomas, a graduate of England's Royal Botanic Gardens at Kew and recognized expert in tropical horticulture. Joining Roy is his wife Margaret, with whom Roy led our very successful program on board the *MV Yorktown Clipper* in the Leeward Islands of the Caribbean in 1989.

### APRIL 28-MAY 2, 1993 GARDENS OF BARBADOS

This once-in-a-lifetime program, offered in conjunction with the Barbados National Trust, features an exceptional collection of historic homes and gardens where our hosts have invited us for special luncheons and dinners. A dinner reception at "Mal-lows," home of Paul and Racelle Altman, provides a cordial welcome to Barbados. Mr. Altman is vice president of the Barbados National Trust. We also visit Andromeda Gardens, creation of Iris and John Bannochie. Started in 1964, this garden is ac-

claimed as the finest botanical garden in the Caribbean, home to thousands of tropical trees, shrubs, and flowers collected by the Bannochie family from around the world. AHS Board Member Katy Moss Warner, from Lake Buena Vista, Florida, will be the leader for this tour.

### JULY 14-26, 1993 GARDENS OF THE MEDITERRANEAN

A voyage of exploration on board the small ship *Stella Maris* from Nice, France, to Venice, Italy. Ports of call will include Portofino, Elba, Sorrento, Messina, Katakolon, Corfu, and the Termiti Islands. Each day brings different gardens in different settings from the unique Château de la Garoupe on Cap d'Antibes, creation of Lady Aberconway, to the medieval Palazzina dei Mulini on Elba; from the cascading flowers on the terraces of Ravello to the quiet meadows of Olympia. Hotel stays in Nice and Venice allow for many exceptional experiences, including a day excursion to the Island of Torcello, one of Venice's Lagoon Islands, where the quiet gardens of Locanda Cipriani attracted Ernest Hemingway. Leading this program will be AHS Board Member Sarah S. Boasberg of Washington, D.C. Joining Sarah as guest horticulturalist will be David Wilson, popular panelist on the BBC program "Gardener's Corner." This is the fifth time that David has helped lead one of our European Travel Study Programs.

### AUGUST 1-19, 1993 GARDENS OF SCANDINAVIA

A unique itinerary into the heart of Scandinavia that will include a three-day side trip to St. Petersburg, formerly Leningrad of the U.S.S.R. Trains and overnight ferries will help us reach Finland, Sweden, Norway, and the Norwegian fjords, and the conclusion of our trip in Copenhagen, Denmark. Our day to day visits are being assisted by the national horticultural societies of the countries that we will be visiting and not only include private gardens but also many great botanical gardens, including the Bergianska Botanical Gardens in Stockholm and the University Botanical Gardens in Helsinki. Not the least among these are the spectacular gardens created by Peter the Great at his Summer Palace in Petrodvorets, just outside St. Petersburg. AHS Board Member Beverley White Dunn of Birmingham, Alabama, will be the leader for this tour.

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