

American Horticulturist

December 1994

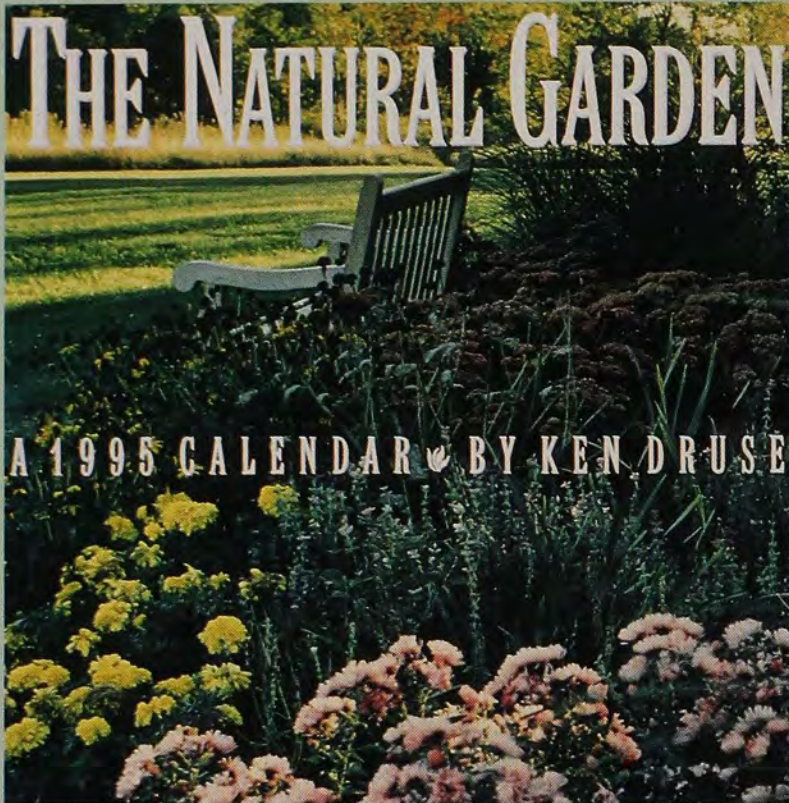
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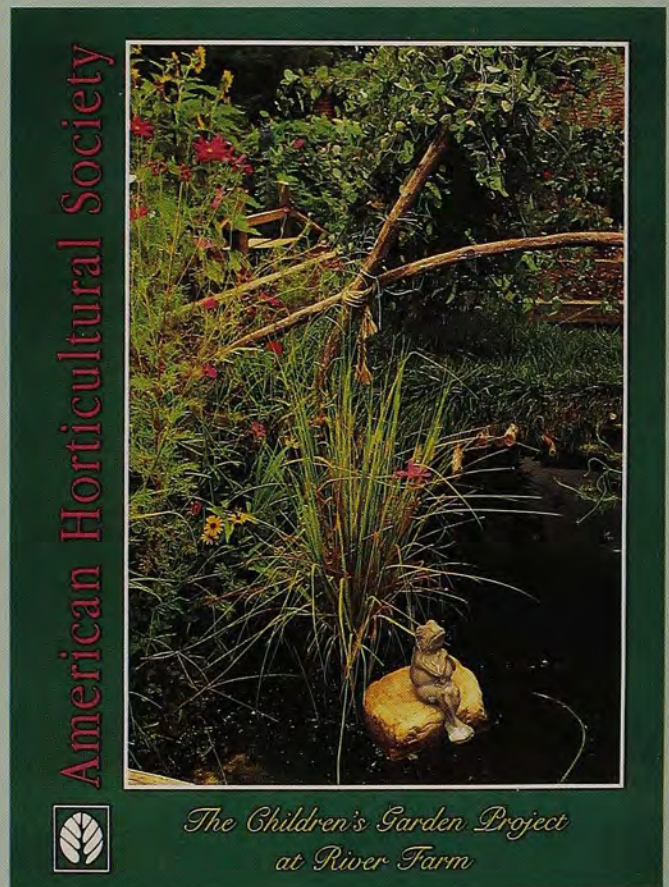
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*The Children's Garden Project
at River Farm*

American Horticulturist

Volume 73, Number 12

December 1994

ARTICLES

All-American Cottage Gardens

by *Rand B. Lee and Nancy McDonald*16
Letting English influence rule this style can be taxing. A horticultural tea party is brewing, and not just in Boston.

Natural Inspirations

by *Richard L. Dubé*23
Nature's patterns can guide your landscape design solutions.

What's the Buzz?

by *Anne Westbrook Dominick*29
Put a hive in the right place, surround it with a few favored plants, and you can have both beauty and the bees.

Knotty But Nice

by *Tovah Martin*34
The gnarled appendages of these geranium relatives make them endearing conversation pieces for windowsills and hanging baskets.

Intrepid Trio

by *Joan Hustace Walker*38
Only three orchid species can call Hawaii their home.

DEPARTMENTS

Commentary	4
Members' Forum	5
Offshoots	6
Gardeners' Information Service	8
Natives at Risk	9
Natural Connections	10
Planting the Future	12
Book Reviews	13
Pronunciation Guide	42
Classifieds	43
1994 Index	45



DECEMBER'S COVER

Photographed by *Joseph G. Strauch Jr.*

In her article beginning on page 29, Anne Westbrook Dominick lists teasel among the many plants that attract honey bees. Both the commonly kept bees, *Apis mellifera*, and common teasel, *Dipsacus sylvestris*, had their origins in Europe. Teasel was brought to the United States by wool manufacturers, who used the dried seedhead to comb the nap of wool cloth, and the species has naturalized widely throughout the United States. Growing up to six feet tall, it looks at home in a prairie garden, where its spiky seedheads remain through winter or can be brought inside to use in dried arrangements.

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The American Horticultural Society seeks to promote and recognize excellence in horticulture across America.

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COMMENTARY

What are the boundaries of horticulture? They are sometimes challenged by new members asking why a certain article was in our magazine, why a trip was planned to a specific area, or why a certain ad was accepted for our news edition. A little more than a year ago, the American Horticultural Society clarified its mission statement and goals.

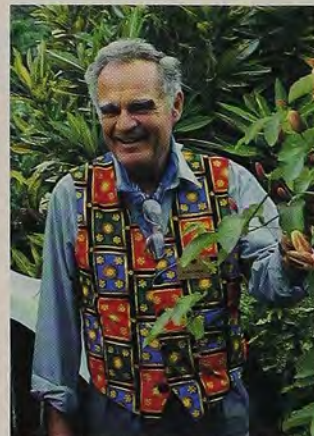
Our mission is to supply informational resources within the expanding horizons of horticulture to foster the principles of the "green ethic." When I entered the field in the 1950s as a research horticulturist for the U.S. Department of Agriculture, our "play book" had remained unchanged almost from Victorian times. Few so-called modern principles of agricultural sciences had been applied to ornamental crops. I watched, supervised, and helped create developments that led to primed seed, regulated seedlings, controlled flowering and plant size, greater stress and air pollution resistance, and greater flexibility in transporting and marketing plants. For each of the dozen or so species we learned to control, others continued to evade the signals that we tried to send by means of light, temperature, chemicals, and nutrition. I watched the emphasis ricochet from annuals to woody plants to foliage plants to perennials to aquatics. Landscape plants, which ranked less than two percent of all crop value in 1975, are on their way to becoming the most dominant and profitable segment of U.S. agriculture, expected to provide almost one in every five dollars generated by crop plants by the year 2000.

This month's magazine reflects a number of issues we believe should become a part of everyone's "green ethic." Most of us have memories of someone's cottage garden. This style has abundance, variety, and a nearly wild appearance that can be very deceptive. Pulling it off requires a knowledge of space requirements and seasonal changes that would test a Pentagon supply officer. Writers from Michigan and New Mexico tell how they have created cottage gardens with low-water, disease-resistant plants appropriate to their climates.

Today we are trying to create gardens that complement, rather than drastically alter, nature. Landscape designer Richard Dubé tells us how to use patterns and shapes in nature to gather ideas and solutions for landscaping problems.

We learn in another article how to create a happy home for those most social of insects, honey bees, offering them nectar and pollen in return for entertainment, pollination of our flowers, and honey subtly scented and flavored by the plants we provide.

Other articles describe efforts to save an endangered Hawaiian orchid—one of only three native to the islands—and species pelargoniums, less refined cousins of the geraniums that color nearly every deck and window box in our country. The former raises questions about how many of today's plant species will be here for our grandchildren; the latter reminds us of a popular plant's heritage.



H. Marc Cathey, AHS President



MEMBERS' FORUM

Penstemons in the East

It was a great pleasure to read Robert Nold's fine article on penstemons ("Penstemon Heaven," October), an underappreciated genus of American wildflowers. Here at Green Spring Gardens Park and in other northern Virginia gardens, we have been experimenting with many of the nearly 270 species to determine their cultural needs in the hot and humid mid-Atlantic states. While most of the eastern species can be grown here rather easily, the western and Mexican species come from such diverse environments that it is important to determine their specific needs if they are to thrive in our gardens. Many of our failures reflect lack of knowledge. However, over the past eight years we have had some successes.

We have found three Mexican species—*Penstemon campanulatus*, *P. kunthii*, and *P. gentianoides*—to be easy growers in sunny, well-drained sites. Only the first succumbed to our minus 6 degree temperatures last winter, but it is easily grown from seed and will bloom the first year, as will many species.

The beautiful shrubbies from the Northwest need special treatment, namely a cool, lightly shaded site and soil that drains well but is not too dry. They are choice rock garden plants. Some, however, like *P. venustus* and *P. barrettiae*, are large enough to use in borders.

Among the wandlike species, the red-flowered *P. barbatus* is the easiest, but we have also had good luck with the purple-flowered *P. neomexicanus*. Many of these southwestern and high plains species flourish and flower during the summer rainy season in their native environment, making them more amenable to our heat and humidity.

There are good, smaller penstemons for full sun and a gritty, well-drained soil. *P. pinifolius* is one of the best, a true shrub with small, needlelike foliage and narrow tubular flowers of red and yellow. Also from the southwest is *P. linarioides*, a small-leaved creeper with

gray-green foliage and lavender flowers and a reliable rock garden plant.

In addition to the well-known *P. digitalis*, two other penstemons will tolerate moist soil if the drainage is adequate. These are the blue-flowered *P. ovatus* from the west slope of the Cascade Mountains and *P. tenuis* from the coastal plain of Texas.

We still have much to learn about the garden uses of this interesting genus. Hybridizing efforts have been spotty and a good text on the genus does not exist. Perhaps in the future these deficiencies will be remedied so that more gardeners may enjoy these intriguing plants.

Don Humphrey
Alexandria, Virginia

For Fuchsia Consideration

For several years I have been delighted with your "Pronunciation Guide." Alas, when your October issue arrived, it was with astonishment that I saw your recommended way of pronouncing *Fuchsia*. I have always heard FEW-sha. That is the way my Taylor's dictionary gives it, although Taylor (and I, too, although my opinion does not carry much weight) suggests an alternative as FUK-see-a. Maybe it is pronounced few-SHA somewhere, but if so I have never visited that area.

Fuchsias take me back to my childhood when we lived in New Zealand and no garden was complete without at least one large fuchsia bush in the yard, frequently hanging over the front fence. While walking home from school we had to stop at every bush and "pop" all the buds. I don't know if it did them any harm or if they bloomed

just as well and I guess I will never know, because now, in Ohio, every fuchsia flower is a treasure and any "poppers" would find themselves immediately un-"pop"-ular.

Lesley Reid
Mantua, Ohio



No, there is no strange little pocket of the nation (as far as we know) that says few-SHA. Makes you want to say "Gesundheit," doesn't it? Our computer must have had a cold that day.

American Horticulturist

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OFFSHOOTS



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Prayers For Tomatoes

by Glen Tig

After living for several years in Sitka, Alaska, in a rainy climate about as well-suited to gardening as a swimming pool would be, I returned to North Carolina with pent-up cravings for the fruits of a southern summer.

On my first day back I met my new neighbor, Jonathan, who explained that he would be six years old in just two more months. We immediately began work on my garden. Jonathan supervised as I tilled the beds, blending cow manure and leaves into the rich, dark redness.

On my Saturday morning pilgrimage to the local farmers' market I filled my basket with tender young starts: banana peppers, green bells, curly parsley, sweet basil. Tomato plants by the thousands smiled and waved, some raucous, some coy, yet every one pleaded for attention. Could 20 of them compensate for my tomatoless summers in Sitka?

By noon, I had painstakingly transplanted, watered, fed, and spaced them in their beds and applied mulch as a loving last touch. Prodded by the warmth of early May, they seemed to grow taller with each glance across the yard. I was proud indeed, proud as a goose with new goslings . . .

Until one afternoon about a week after planting, when I pulled into my drive and, from a distance, saw no sign of my 20 little champions. Stopping the car abruptly, I ran to investigate the crisis without finding even a trace of a tomato plant—no broken stems left by nibbling rabbits, no

wilted remains from heat stress, no tracks from large game, nothing. Stunned, bewildered, in shock, I stumbled from row to row. The peppers, too, were missing. And each and every basil plant had vanished. Clearly, I had been vandalized.

To Jonathan and his mother, I must have appeared quite the spectacle, a dazed neighbor floundering in rage. When I drove up, they were squinting each other with the water hose, squealing with happy



giggles. Now they stood close beside each other, eyeing me in silence.

"Something really weird has happened," I yelled across the yard. "My garden has disappeared." They came over to inspect for themselves. Jonathan's mother, having kept a garden her whole life, said she'd never seen anything like it. She began questioning Jonathan as to whether he'd seen anyone messing around in my yard while he was out playing.

I called other neighbors and asked if they'd seen any unfamiliar vehicles or people near my lot. No one knew a thing. After an hour had passed, I heard a timid knock on my door. Jonathan stood on my porch with a frightened, sad expression, offering up a handful of pitiful tomato plants. Said his mother, standing behind him, "I'm afraid Jonathan has something to tell you."

"I found these," Jonathan said. "They were in our back yard." His mother urged him on with a stern glare. "I think they might be yours," he said. With now dry roots and limp leaves, my hybrid yellows and heirloom pinks were positively unrecognizable.

"Yes, I think they might be," I said. Though I tried to speak calmly, I wanted to scream when I asked, "But how do you think they got in your back yard?"

"Somebody must have put 'em there," Jonathan said. His mother's eyes pushed him further. "I mean . . . I took 'em," he said, "because . . ."

I could feel my blood pressure rising. How dare he? I thought this little fellow liked me. What reason could he have for doing such a mean thing? I looked at Jonathan with a blank face and waited while he stammered.

"Because . . . I wanted a garden like yours."

I gulped. Ready for anything that would justify my fury, I was not prepared for this. I paused and shook my head from side to side, but there were no words on my tongue. I knew whatever came out had to be careful and honest.

"Jonathan," I said, "I'm very glad that you told me what you've done, but I am so angry and confused, I have to go cool down my temper before I can talk to you about it." We all agreed to get together again in half an hour.

Besides needing to spout off some steam, I also needed time to scheme. How could I turn this into a learning opportunity for Jonathan? When we met in the garden later, Jonathan appeared with another handful of drooping plants. There was my cue.

"Oh, how sad those plants look," I said. "It's good that you're here now to help out so we can try to save them before it's too late." Jonathan and his mother looked equally perplexed. "It's important that we hurry," I said. "Can you see how sad these plants are? It may be too late to help them all, but I bet we'll be able to save a few of them."

As we collected the shovel, water hose, and hand tools, I explained that plants need many of the same things people need. We talked about different ways to help sick plants regain their health. I dug the holes and held the dirt back while Jonathan laid each critically ill patient delicately in its bed. I pressed the soil firmly around the roots and he "tucked it in," surrounding it snugly with mulch. Jonathan commented that this attention at bedtime was something else plants need, just like people.

I expected that some of our replantings would in all likelihood survive. According

*He opened his eyes
and whispered to me,
"Did I forgetting
anything?"*

to my strategy, this would help Jonathan see the worth of his work and connect his careful efforts with prosperous, fruitful plants. I was self-satisfied indeed as we neared the end of our task. "What a clever teacher I've been," I thought, "turning this catastrophe into a lesson for my young friend."

Busying myself with rolling up the hose and putting away the tools, I scarcely noticed that Jonathan had made his way back to our first replanted tomato. Sitting beside it, he was mumbling some indiscernible words with his eyes closed. Momentarily, he completed his mysterious powwow and scooted without hesitation to the next plant. This wasn't part of my grand design. What antics could he possibly be up to now?

I sat down beside him on the ground as he resituated himself. Reaching out to the second plant, he pressed a wilted leaf gently between his thumb and forefinger. He indicated that I should do the same. Then he closed his eyes.

"Little plant," he said, "I'm real sorry I pulled you up and made you get sick and

have dry roots. And I'm gonna take real good care of you now and water you every day and help you get better." Humility overtook me. Jonathan continued: "I won't do it again and I hope you grow up happy and make lots of big, red tomatoes." He opened his eyes and whispered to me, "Did I forgetting anything?"

Jonathan was asking me if he had forgotten anything, as if I, being the grown-up, should know. Stepping down off my pedestal, backing away from my pulpit in the face of this lesson in sincerity, I whispered back, "Oh, I think that's just about perfect, Jonathan. What do you think?"

He let go of the leaf and said decisively, "I think there's a lot more plants to pray for on this row before we get on to the next one." He crawled ahead, took hold of another plant, closed his eyes and began another full-length prayer, and another and another until each tomato, pepper, and basil plant in the garden had been blessed, one by one, row by row.

The next day, Jonathan knocked on my door to fetch me for more prayers. The first, second, and third plants received full attention, but by the middle of the row, the blessings became noticeably shorter. Jonathan seemed to be losing steam. As we approached row two, he stood quietly, turning his head from side to side, eyeing all the remaining plants. Suddenly, he addressed the garden at a volume sufficient for the most inattentive Great Power: "LITTLE PLANTS! . . ." Whoever said there was anything dishonorable about praying for the masses?

Some weeks later, Jonathan told me his family was moving away. I learned they were moving closer to his father's job, into an apartment with a sun deck. On the day of departure, when Jonathan came over for his last inspection of our prosperous tomato crop, he inquired why there was a hole in the ground where one of the healthiest plants had been. I diverted that question, but soon he had another—about the big plastic bag on my porch with the wide red ribbon around it.

When I asked how many more weeks it was until his birthday, he proudly put up three fingers. His attention drifted again toward the ribbon as a grin of comprehension came over his face. With only a slight nod of consent from me, Jonathan tore into the bag, unveiling a two-gallon pot of soil and a thriving, bushy, patio tomato plant—with blossoms.

Glen Tig is a psychotherapist, writer, and gardener who returns this month to live in south central Alaska.

GARDENERS' INFORMATION SERVICE

Editor's Note: While AHS Education Coordinator Maureen Heffernan is on vacation, our guest columnist is Jacqueline Hériteau, who writes a twice-monthly newspaper column based on questions raised on "Growwise Gardener," the weekly radio call-in show moderated by AHS President H. Marc Cathey.

Q: *I'd like to propagate some roses next season. When should I do that, and how?*

A: Roses root easily in late winter and early spring. My grandmother used to get out her pickle jars in late February and make rose cuttings. Cut healthy green stems four to six inches long. Choose some with no side shoots. Clean each stem in a weak solution of household bleach, dip the bottom tip lightly in rooting powder, then stick it into the dirt in a sunny spot in your garden with a jar over it to act as a little greenhouse. They'll root in six or eight weeks.

Q: *I've moved a big hibiscus that was outdoors all summer into our south bay window, and plan to use it as a Christmas tree. It's still putting out blossoms, but the leaves are dropping.*

A: What a great idea! Don't worry about the leaf drop. It's natural for a hibiscus to drop leaves when it is brought into dry indoor air. Mist it often to help it adjust. It will winter well as long as it isn't over-watered. This may be happening if the foliage goes from strong green to a ghostly green. Take it out of the pot and let the root ball dry for a day or two before you put it back. Fertilize it lightly once a month until the days begin to lengthen and new growth begins.



Q: *My fiddle-leaf fig grew from about 10 inches to two feet this year, but the trunk isn't getting thicker and there's no growth on the bottom. What am I doing wrong?*

A: Fiddle-leaf fig (*Ficus lyrata*) is one of the great plants of Africa, but between October and late March our light levels are such that it will grow but not thicken. At every watering add 20-20-20 fertilizer, a quarter teaspoon to a gallon of water. Try sunbaths every few weeks. As daylight lengthens, the plant will get thicker.

Q: *Last fall my wife and I gathered about 200 acorns and planted them in a former orchard we bought. They're planted one and a half inches deep in rows of mounds six feet apart, several acorns to a mound. What's our next step?*

A: As they develop, remove the weakest from each mound, leaving one tree. Don't fertilize them until the second year—they'll be stronger if they're grown on the lean side until they get a root system based on natural fertility. Mulch them with chips, about a bucketful in a three-foot circle around each tree. The early danger in field-grown plants is that weeds may overcome the seedlings. Transplant only after two growing seasons.

Q: *My 15-year-old oak tree develops multiple leaders and side branches that grow in toward the trunk. It has four leaders now and is about 13 feet tall. How should I prune it?*

A: A trunk with multiple leaders is likely to split in storms as it gets older. Take all but the best leader out, and train the remaining leader by tying it to a bam-

boo cane. This winter, remove the limbs growing in the wrong direction, and continue this type of pruning for the next 10 years. Once the competition for the lead spot is over, I think the whole character of growth will change.

Q: *Last winter we lost a lot of our landscape foliage to deer. Before I replace these plants, can you offer any advice for Bambi-proofing them?*

A: Deer, it seems, can't stand Milorganite, Milwaukee's composted municipal sludge, which has been sold as an organic fertilizer since 1926. This isn't mentioned on the packaging, but it's been bruited about for the last three years or so, and a 1991 study by the Cornell Cooperative Extension Service in Millbrook, New York, confirmed what gardeners already knew.

Milorganite is suitable for all crops, including food, and it is distributed nationally and internationally. Unfortunately, Milorganite's effect on the deer lessens in fall, when the odor is less pronounced. And, of course, snow and ice will smother it.

You might also consider selecting Bambi-resistant plants. Bob and Bev Tanem, deer-friendly California nursery owners, have published a booklet listing plants that deer in their area appear not to like. These include most prickly things, as well as ginkgoes, crape myrtles, junipers, spruces, pines, and sumacs among woody plants, and lovely herbaceous ornamentals like yarrow, asters, English daisies, baby's breath, poppies, phlox, tuberous begonias, crocus, scilla, daffodils, forget-me-nots, portulaca, dusty miller, and hollyhocks. "Deer Resistant Planting" is available for \$5.95 from Tanem's Garden Center at 273 North San Pedro Road, San Rafael, CA 94903.



NATIVES AT RISK



MARYL

Kuenzler Hedgehog Cactus

by Mary Beth Wiesner

The New Mexico Department of Agriculture wasn't sure the Kuenzler hedgehog cactus should be placed on the federal list of endangered species. But not because the plant—with a population estimated at 3,000 to 5,000—isn't at risk. Officials were worried that listing *Echinocereus fendleri* var. *kuenzleri* might increase the threat to the species, which has been nearly decimated by overzealous collectors.

When the U.S. Fish and Wildlife Service (FWS) considers a plant for the federal list, it also determines whether it should designate a "critical habitat" for the species. Critical habitat maps, which detail the exact locations of the plants, then become public record. "If a plant is to have its whereabouts in the Federal Register, there may as well be a copy of its death notice too," one expert commented. Despite the concern, in 1979 the cactus was added to the list of plants protected under the federal Endangered Species Act.

Although the plant is available through authorized growers, cactus lovers still seek wild populations of the Kuenzler hedgehog cactus. "For some reason collectors prefer wild plants to those grown in greenhouses," says Anne Cully, a biologist with the FWS's Albuquerque, New Mexico, field office.



Prized for its large funnel-shaped magenta-to-purple flowers, the cactus was discovered in 1961 by Horst Kuenzler, a resident of Canada vacationing in the United States. Kuenzler saw a clump from his car, stopped for a closer look, and took two specimens that ended up in the herbarium at the University of New Mexico in Albuquerque. Since 1982 the cactus has been unofficially accepted as a variety of *E. fendleri*, but it may be the northern extension of *E. hempeii*, a native of the Mexican state of Chihuahua.

The Kuenzler hedgehog cactus is found at elevations of 6,000 to 7,000 feet on sparsely vegetated rocky outcrops in the piñon-juniper woodlands of New Mexico's Sacramento Mountains. Cully believes this is the northernmost range of *E. fendleri* var. *kuenzleri* because the cactus seems to need grass cover to protect it from the cold. For that reason, cattle grazing is also considered a threat to the species.

A few dealers who collected seed prior to 1979 are propagating and selling the cactus. One is Steve Brack, owner of Mesa Garden in Belen, New Mexico, who says the wild population of the cactus is "very low," partly because it is susceptible to a fungal disease. "Thousands have died. It turns the plants into a black slime."

To buy endangered plants or seeds from out-of-state sources, purchasers must obtain an interstate commerce permit, issued by the FWS. In-state purchases are legal as long as the grower has an FWS permit.

Mary Beth Wiesner is a free-lance writer in Woodbridge, Virginia.

SOURCES

- Abbey Garden Cacti and Succulents, 4620 Carpinteria Avenue, Carpinteria, CA 93013, (805) 684-5112. Catalog \$2.
- Mesa Garden, Box 72, Belen, NM 87002. Plant list available with SASE.

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NATURAL CONNECTIONS

Fragrance of Fir

Anyone who has walked in the forests of Maine, New Hampshire, or Vermont has an olfactory memory of balsam fir (*Abies balsamea*). Its spicy fragrance, redolent of the north woods and of Christmas time, is unmatched by any of the synthetic products that shopping malls use to evoke the same nostalgia.

Balsam fir is a shade-tolerant species partial to cool climates and moist but well-aerated soils. It is often found in rocky soil close to water and has been seen at elevations ranging from sea level to near the timberline, although its usual range is from 2,800 to 5,000 feet. At or near the timberline it is often seen with the tenacious black spruce (*Picea mariana*). Although usually associated with New England, balsam fir, along with white spruce (*P. glauca*) and red spruce (*P. rubens*), is a key component of the boreal conifer forest that stretches across northern North America. Other common associates include jack pine (*Pinus banksiana*), tamarack (*Larix laricina*), and paper birch (*Betula papyrifera*). Balsam fir is found from Labrador south to Pennsylvania and west to the Great Lakes. North of the lakes its range extends diagonally northwest across the prairie provinces of central Canada to near the headwaters of the Yukon River in British Columbia. It is also seen at high elevations in parts of Virginia and West Virginia.

Because of its soft wood, balsam fir was never a tree of choice for the lumber industry, but it is a minor source of timber for dimension lumber, interior paneling, and crates. It was one of the first tree species used to make paper and in the opening decades of this century it was slated, along with spruce, to become a principal source of pulpwood for the expanding paper-making industry in New England. But beginning in 1909, a severe infestation by the fir's principal in-



DAVID STONE PHOTO/NATS

Balsam fir can be distinguished by flattened needles that spiral around the branch.

sect nemesis, the spruce budworm (the larval stage of the moth *Choristoneura fumiferana*), devastated thousands of acres of fir and spruce forest. Surviving trees were 30 to 40 years from harvestable size and in the 1920s New England's paper-making industry gravitated toward hardwood trees. In time balsam fir recovered and, despite another bad infestation of spruce budworm in the late 1970s, is now used extensively as pulpwood in New England.

It is believed that fir trees, possibly silver fir (*Abies alba*), served as the prototype in medieval Europe for what has become the Christian tradition of bringing an evergreen tree into the home at Christmas time. In North America, since the middle of the 19th century, balsam fir has been one of the most popular Christmas trees. Its symmetrical conical form matches the traditional ideal, and its sturdy yet flexible branches and soft needles lend themselves to hanging ornaments. Along with needle retention unparalleled among evergreens, balsam fir also keeps its spicy fragrance and bright color throughout its tenure inside. Those qualities have also made the tree a major source of greenery for Maine's burgeoning wreath-making industry.



Balsam fir accounts for about eight percent of annual U.S. Christmas tree sales, according to the National Christmas Tree Association in Milwaukee, Wisconsin. The more widely available Scotch pine (*Pinus sylvestris*) is the top seller at 36 percent, followed by Douglas fir (*Abies douglasii*) with 20 percent.

Despite its popularity, balsam fir has not proved to be a very successful landscape tree, possibly because of a susceptibility to pollution and a need for a steady supply of moisture to its shallow root system. In the wild, balsam firs may grow as tall as 90 feet, but the average height is between 25 and 60 feet. They are not long lived, usually succumbing to a combination of pathogens and environmental stresses within about 90 years, although 150-year-old specimens have been seen. Balsam firs look very similar to spruce trees, but can be distinguished by their cones, which are held upright rather than hanging down, and by their needles, which are flattened rather than square like spruce. Balsam fir's slightly tapering two-to-four-inch green cones ripen to purple in September and yield light brown seeds with a single wing. Heavy cone crops occur cyclically every two to four years. Fir needles are a glossy deep blue-green on top and pale green with two silvery lines beneath. The needles appear to form two comblike rows, but in fact spiral around the branch in a gentle whorl.

Young trees have smooth gray bark stippled with resin blisters containing the balsam that gives the tree its name. Known as Canada balsam, the transparent aromatic resin was used by Native Americans as an inhalant for treating headaches, and as a salve for wounds and burns. Later, woodsmen also used it to cover wounds and as a form of chewing gum. Commercially, it was once used as a fixative for mounting specimens on microscope slides. The flammable resin can be an Achilles heel, however, igniting and turning individual trees into torches during forest fires.

For years, pillows stuffed with the aro-

matic needles have been sold as sachets or to remind former New Englanders of home. Along with the aromatic fir oil, the needles contain chemical compounds that act as a natural insecticide by mimicking a hormone that interrupts insect growth cycles. Some pests, however, are not affected by the chemicals. The spruce budworm, which despite its name selects firs as its preferred host, feeds on the tender new flower and foliage buds in spring. Dead tree tops and brown foliage loosely banded with webbing reveal their infestations, which, left unchecked, can kill trees in five years. Balsam woolly adelgids (*Adelges piceae*) and red heartrot, a fungal disease, also take a toll on firs.

In winter the foliage provides browse for more benevolent feeders, like moose, white-tailed deer, and various types of grouse. Porcupines feed on the bark, and the seeds are popular with birds and small mammals.

Whether in the woods or in the home, balsam fir is a sensual treat—its glossy blue-green foliage pleasing to the eye, its smooth flexible needles begging to be touched, and its intense aroma providing a natural potpourri.

—David J. Ellis
Assistant Editor

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GARDEN DREAMS



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PROGRAM HIGHLIGHTS

"A Fourth Generation Garden"

Author Charles O. Cresson will talk about his family garden, Hedgley Spring, which he oversees in Swarthmore, Pennsylvania.

"Rustic Garden Features"

Marvin Davis, whose rustic garden adornments appeared in the October *American Horticulturist*, will show how this style can be successfully introduced into any garden.

"Summer Color and Fragrance With Bulbs"

Brent Heath of the Daffodil Mart in Gloucester, Virginia, will show us the amazing variety of forms, colors, and uses represented by summer-flowering bulbs.

"The Art Moderne Garden: Fletcher Steele Comes to America"

Sarah S. Boasberg, AHS chairman, will trace the art moderne movement in Europe and its immigration to America.

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PLANTING THE FUTURE

Garden Videos

by Larry Johnson

When I was young, I often stayed with my grandparents in the country. On nature walks with my grandmother, I developed my love of gardening and storytelling.

In the early '70s I began to use television for storytelling and children's education. I produced and hosted a local children's television show with an environmental message in Austin, Minnesota. I told stories and Tyler, a big purple angleworm with a blue baseball cap, tended the garden.

In 1977, Tyler helped me start a participatory call-in TV channel for patients in Minneapolis Children's Hospital. We planted a garden on the roof and taped Tyler talking to patients in the garden.

Now I'm a storyteller/video teacher in Minneapolis, teaching young people to tell stories, plant gardens, and make international video "letters." My Minnesota students have been amazed to see their video pen pals from Ecuador growing corn and standing in a banana jungle, and to watch their Georgia pen pals harvesting peanuts and cotton. You can join us!

All you need to create a garden video letter is a thriving indoor or outdoor garden tended by children, a camcorder, and a person with homestyle video experience to help the children show and tell what's going on in the garden.

Decide what to show your video visitors in a group planning session. Garden games you play? Children telling garden stories? A field trip to a garden-related place? How you turn kitchen scraps into compost? Garden songs?

Keep the video simple and interesting—15 to 20 minutes is plenty. Let each child narrate a small portion, giving his or her name and showing the garden, its setting, and favorite projects. End with some in-

formation about what you'd like to see in the return video. If you're not editing, plan your shots and tape them in order, fading to black between scene changes.

Clear sound is important, so use a handheld mike, or keep the sound source close to the built-in mike on the camera. Then think visually, even when asking what you'd like in a return video. If you show something you're doing and ask your video friends to respond, they'll be more likely to *show* their activities. We play Garden Bingo on our school's closed-circuit channel. We've also invented games like "scarecrow," played like hangman except we use garden words and build a scarecrow.

Ideally, children will learn to produce and tape a video tour themselves. But no matter who does the actual taping, they shouldn't feel pressured to create a "professional" product. A video exchange should be likened to a neat, handwritten, loving note to a friend. Certainly you don't want a sloppy video that can't be heard or seen, but beyond that its purpose is mainly to communicate.

Finding international children's gardens to trade videos with is still difficult, but you can find U.S. gardening classrooms through the National Gardening Association's Growing Ideas Exchange. Write them at: NGA Growing Ideas, 180 Flynn Avenue, Burlington, VT 05401.

If you'd like to start by trading videos with me, send me a video or a postcard requesting a video for your group of children to respond to. If you have questions about producing a video or dealing with the challenges of international exchanges, send your questions with a stamped, self-addressed envelope to Larry Johnson, 315 Georgia Avenue North, Minneapolis, MN 55427.

Larry Johnson was a speaker at the first AHS symposium on children and gardening, held in 1993.



BOOK REVIEWS

The Art of Botanical Illustration

Wilfrid Blunt and William T. Stearn. *Antique Collectors' Club, Wappingers Falls, New York, 1994. 368 pages. 11" x 8 1/4". Color plates and black-and-white illustrations. Publisher's price: hardcover, \$59.50. AHS member price: \$51.*

Almost 50 years ago, the editors of the New Naturalist series of books on British natural history decided to produce a title on botanical art and illustration. One editor asked Wilfrid Blunt, art master and author on interesting persons and travels, to undertake the work. Another editor, however, asked William Stearn, eminent botanist at the Natural History Museum in London. The two scholars agreed that Blunt would write the text and Stearn would revise and augment it. The result was the first edition of *The Art of Botanical Illustration*, published in 1950, and reprinted in 1951, 1955, and in 1967 in Japan.

In both the original and the updated editions, Blunt and Stearn devoted chapters to such topics as herbals, etchers and engravers, the importance of the flower-piece in 17th-century Dutch painting, West and East, and the *Botanical Magazine*. They also covered such prominent figures as Otto Brunfels, Leonhart Fuchs, Daniel Rabel, Nicolas Robert, Claude Aubriet, Georg Ehret, Pierre-Joseph Redouté, William Kilburn, Francis and Ferdinand Bauer, Robert Thornton, Walter Fitch, and John Ruskin. In more recent years, Blunt had wanted to revise the work, but the loss of the original plates by the publisher made a new edition more costly to produce. Now, seven years after Blunt's death, the co-author has published what is essentially the same work, with some slight alterations and additions to the text and with some changes in illustrations.

The chapter on botanical art in the 20th century has, of course, been updated. In my opinion, however, Stearn has overemphasized the work being done in Africa, Greece, and Australia. What a pity not to



mention Claus Caspari (Germany), Aline Marie Roques Raynal (France), Marilena Pistoia (Italy), and Rory McEwan and Susannah Blaxill (England). Nor does he touch on the Society of Botanical Artists, founded by Suzanne Lucas, which is the focus for contemporary botanical art in Great Britain. Modern Japanese botanical draughtsmanship is limited to a footnote, and mention of American artists is confined for the most part to a paragraph of only eight lines.

As Professor Stearn noted in his introduction, however, no book of moderate size can adequately encompass the display of so much talent. At the Hunt Institute, we regard this as the classic work on the history of flower painting from antiquity to the present day. I hold this book in high esteem and routinely refer to it. It is a good value, a must for anyone interested in plants and art, and an invaluable, if incomplete, guide for those interested in collecting works of botanical art.

—James J. White

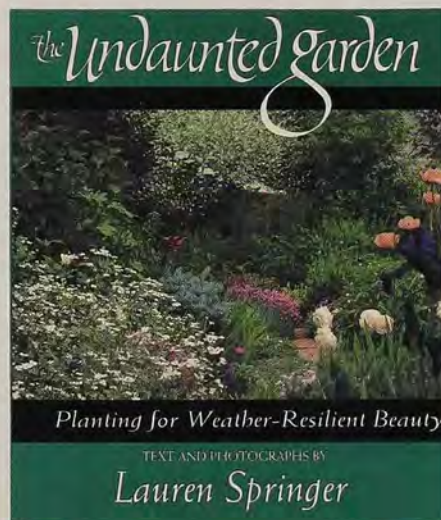
James J. White is curator of art for the Hunt Institute for Botanical Documentation at Carnegie Mellon University, Pittsburgh, Pennsylvania.

The Undaunted Garden

Lauren Springer. *Fulcrum Publishing, Golden, Colorado, 1994. 244 pages. 8 1/2" x 10". Color photographs. Publisher's price: hardcover, \$29.95. AHS member price: \$26.75.*

After 40-odd years as an avid gardener and reader of gardening books, I admit to a touch of "ho-hum, what's new?" when browsing through the latest offerings. Lauren Springer's first book (but not, I devoutly hope, her last) is as refreshing in style and content as a cool shower on a hot day. She has the gift of infectious enthusiasm, and as gardener, writer, and photographer she takes her place among the best.

"A Passion for Plants" would have made a good subtitle. Nothing, you come to understand, is going to deter Lauren Springer from gardening, wherever she may live. At present Colorado is the lucky state to claim her, and she makes it plain that if cold, heat, drought, and hail cannot be conquered, then they can be managed by appropriate choice, placement, and care of plants. This includes relying a good deal on native plants and refraining from watering some of them, but the book is free of that mood-of-the-moment sermonizing that seeks to force all gardens into the same mold.



Looking at the lovely pictures you might suppose that they were taken in an English cottage garden. Not so. Home is a town corner lot where, undeterred by such hazards and limitations as two- and four-legged passersby and height-restricting ordinances, she has extended her one-third acre by planting the sidewalk verges as well, turning these "hell strips" into something more like a gardener's heaven.

Don't deny yourself this book just because you live in the Northeast or on the West Coast. Having gardened in other re-

gions, the author can make comparisons, favoring close planting, for example, but mentioning that this may induce rot where summers are hot and humid. Two plants new to me this year and last—a tansy species, *Tanacetum niveum*, and Arizona giant pink anise hyssop, *Agastache barberi*—were gifts from Lauren's garden. They are equally happy in my coastal Virginia plot.

My congratulations to the publisher as well. The thick book is stitched to open flat, and the reproduction of the more than

250 photographs is excellent. At less than \$30, this is the best value in garden books I've seen in a long time.

The best gardening books make you long to have the writer for a neighbor, to be able to say "Would you like a bit of this . . . will you share a bit of that . . . have you tried so-and-so?" This is that kind of book.

—*Pamela Harper*

Pamela Harper is a free-lance horticultural writer and photographer who lives in Seaford, Virginia. Her most recent book, Color Echoes, has just been released by Macmillan.



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Pests of Landscape Trees and Shrubs: An Integrated Pest Management Guide

Steve H. Dreistadt. ANR Publications, University of California, Oakland, California, 1994. 327 pages. 8½" × 11". Color photographs, illustrations, and tables. Publisher's price: softcover, \$32. AHS member price: \$28.50.

Although ostensibly developed for landscape managers and residents of California, *Pests of Landscape Trees and Shrubs* is undoubtedly one of the most complete integrated pest management (IPM) reference works available.

Unlike encyclopedic works, strong on illustration but often too heavy-handed with remedial measures, this latest product from the University of California's Integrated Pest Management Project puts its emphasis on actually developing a sound IPM program.

Anyone interested in pursuing an IPM regimen would be well-advised to read—and re-read—chapters on "Designing an IPM Program" and "Growing Healthy Trees and Shrubs," before launching into the exhaustive sections on pests, diseases, environmental problems, weeds, and so on. All too often, a compulsion to solve problems quickly gets IPM programs off to a bad start.

One of the greatest virtues of IPM is problem avoidance. The appropriate selection of plants, site preparation, and a sound management plan can help eliminate a host of potential problems. A chapter on abiotic disorders—those caused by mechanical or environmental factors—emphasizes careful soil preparation and site selection to avoid problems like mineral deficiencies, sunburn, exposure to road salt, and even lightning strikes!

Amateurs and professionals alike will treasure the valuable tables, diagrams, and references that support each chapter. Ta-

bles listing pest- and disease-resistant plant alternatives will help with landscape planning. There is an entire chapter devoted to insects, mites, snails, and slugs, complete with descriptive information, astonishing color photographs for identification, and monitoring and management protocols.

The centerpiece of the book is the group of problem-solving tables in chapter nine. Undoubtedly, many readers will turn to this 50-page section first, looking for easy solutions to often long-term problems. It is to the credit of the University of California team that the final column of each table lists "comments" rather than "solutions." Each probable cause leads back to the IPM program itself.

In many respects, IPM is ill-served by its very name. Instead of the "P" representing "pest," it ought to stand for "plant" or perhaps even "patience," to focus attention away from environmentally injurious quick fixes, whether chemical or biological, and onto planning and prevention, observation and identification, management and correction, continued monitoring, and long-term commitment. To this end, readers and users of *Pests of Landscape Trees and Shrubs* will find themselves well-served. —Joseph M. Keyser

Joseph M. Keyser is the environmental specialist for the Montgomery County, Maryland, Department of Environmental Protection.

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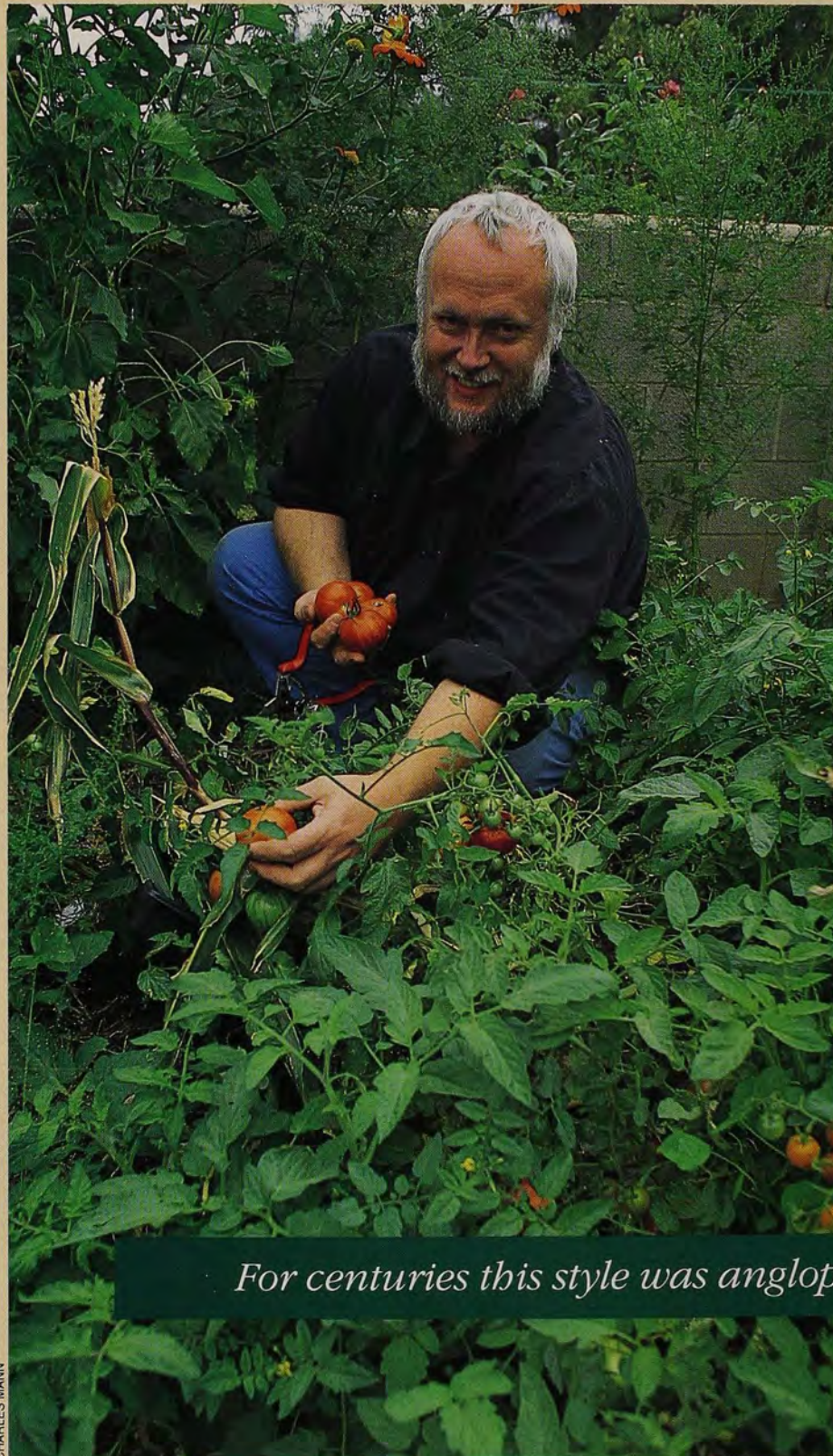
In the heat-baked alkaline clay of New Mexico, “cottage” can’t mean “coddle.”

BY RAND B. LEE

The term “cottage garden” tends to conjure up images of misty English countrysides, crammed with a somewhat limited number of “old-fashioned” ornamentals: primroses, sweet Williams, hollyhocks, dame’s rocket, cabbage roses, perhaps an herb or two. But in fact the first cottage gardens—the style dates to the Middle Ages, the term to the 18th century—were extremely utilitarian collections of fruits and vegetables; the flowers came later.

A cottage garden isn’t a style of any one time or place or a particular kind of plant. It is an informal garden of intimacy, variety, and idiosyncrasy, stocked with plants chosen for ornament, sentimental association, fragrance, food and cut flower production, uses as flavorings or medicines, or historical interest. It should be sited near a dwelling so it can be easily reached from the kitchen or main living area, and it should be laid out to invite entry, exploration, and repose. It may include annual, biennial, and perennial flowers; herbs, vegetables, and fruits; vines, shrubs, and (if space permits) trees. Any obvious show of wealth must be avoided in the plants chosen and the materials and ornaments

continued on page 18



For centuries this style was anglophile.

CHARLES MANN

Cottage Gardens

The Michigan growing season is short, but it can also be sweet.

BY NANCY McDONALD

In our far northern Michigan garden (USDA Zone 4), the growing season is short and cool. Summer days are long, but nights can drop into the 40s. Tomatoes are a challenge, melons just a dream. Winters are severe, with temperatures well below zero for long periods. Fortunately, our good snow cover keeps perennials safe; we rarely experience frost-heaving. Shrubs are another matter, and winterkill is common.

Our soils are extremely sandy and rocky. The subsoil beneath our new orchard measures pH 4.5, though the surface soil tends to be pH 5.5 to 6.0. Blueberries and potatoes thrive here. Our worst pest is the white-tailed deer, with chipmunks a close second. Far behind either come insect pests. Our severe climate keeps many of these, as well as many plant diseases, in check. Despite these challenges, our garden contains more than 1,700 different species and cultivars of perennials and shrubs from all over the world. While I'd never voluntarily give up my imported treasures, more and more I find myself choosing native plants to withstand our conditions.

The cottage style of gardening is the perfect application for native plants and their

continued on page 19



Now revolution is afoot.



continued from page 16 used in the garden's construction. Since ease of maintenance is one hallmark of the cottage garden, efforts should be made to emphasize plants that are naturally suited to the climate and soils of the local region. This means, for American cottage gardeners, an increased use of native American species and cultivars.

When I first rented my home in Santa Fe in 1989, I was daunted by the scant 15 inches of rain a year, the 15 percent humidity, the blazing sun and high winds of our 7,000-foot altitude, and the heavy loamless clay soil, which undoctored runs to a pH of 8 or higher. In my 300-square-foot garden, I have found myself using more and more native plants and adaptavars—non-natives that fit in with a minimum of hand-holding—to form the backbone of my mixed borders.

Penstemons, my current mania, are getting heavy use in my 12-foot diameter Wheel of Creation bed, in which a central core is surrounded by six pie-shaped wedges, each with a different color theme. In the red section are scarlet bugler (*Penstemon barbatus*), the cardinal penstemon (*P. cardinalis*), and *P. rostriflorus* (aka *P. bridgesii*). All three bear bright red tubular flowers for many weeks, the first two on stems to three feet, the latter to two feet. With them grow the somber wine-red perennial *Gaillardia* × *grandiflora* 'Burgundy'; the red form of Mexican hat (*Ratibida columnifera*), which is perennial for me; and the hummingbird trumpet, *Zauschneria arizonica*. If the last survives our winter it will eventually grow three feet tall by four feet wide. It bears gray-green leaves and bright scarlet funnel flowers in loose racemes. Completing the wedge are tall scarlet zinnias (*Zinnia elegans* 'Red Man'), whose origins are Mexican; dark red annual nasturtiums from the Andes (*Tropaeolum majus* 'Mahogany'); a red California poppy (*Eschscholzia californica* 'Dalli'); and the lipstick-red Drummond phlox (*Phlox drummondii*).

In the orange pie wedge, I feature the firecracker penstemon (*Penstemon eatonii*), a three-foot-tall sparkling red-orange. It shared its space this year with the orange sneezeweed (*Helenium hoopesii*), which in late spring opens its big lolling



CHARLES MANN

primitive orange daisies; Mexican campion (*Silene laciniata*), with its fringed red-orange tubular flowers; tall African marigolds (*Tagetes erecta* 'Deep Orange Lady'), which despite the common name hail from Mexico and Central America; and standard gold-orange California poppies (*Eschscholzia californica*), which seed themselves all over the place.

The dry front of the yellow bed is claimed by an unusual form of the compact *Penstemon pinifolius*, which is usually scarlet. In this case the needle-like leaves, which form a cloud of pale green, are smothered in tiny, pale yellow tubular flowers in very early summer. *P. confertus* bears tubular blooms of an even paler yellow

low on 20-inch stems. Much taller, much easier, and much longer in bloom is the golden columbine, *Aquilegia chrysantha*, a polite re-seeder whose nodding yellow heads are a lovely contrast to the blue-green foliage. The spurred blooms are fragrant, and it can top three feet with ease, flowering six weeks for me beginning in late spring. With it I grow *Gaillardia* × *grandiflora* 'Yellow Queen', which if dead-headed makes huge pinwheels of milky yellow all summer. Backing all these is the golden *Helianthus scabra* 'Summer Sun', which starts blooming for me in August.

Among the natives in the pale- to mid-blue wedge is *Salvia azurea*, the blue sage,

continued on page 20



CHARLES MANN

Each wedge of Lee's Wheel of Creation bed, top, features flowers of a different color; cosmos, above, native to Mexico, seeds itself throughout his garden.



continued from page 17

cultivars. Being more pest and disease resistant, natives often require less care than exotics, and many provide food for wildlife, as well. A note of caution, however: It will behoove you to do your homework before planting natives in the smaller garden. Many can be extremely invasive. Sometimes it's better to seek out politer cultivars than to grow the species. Those of *Monarda*, *Physostegia*, and many others can be labor-intensive in rich soils, where they will thrive all too well. Some asters can be trusted; others cannot (clump-formers like 'Alma Potschke' and 'Purple Dome' are safe bets). The combinations of natives that follow are particu-

lar favorites in our cottage garden.

In late spring a fetching pair blooms in the light shade of an old apple tree, where they are much visited by hummingbirds. The pale yellow form of wild Canadian columbine (*Aquilegia canadensis* var. *flavescens*, also called *A. canadensis* 'Corbett') dangles its sprays of dainty skyrockets, through which grow sprigs of *Polemonium reptans* 'Blue Pearl'. Blooming with them are our local yellow trout lily (*Erythronium americanum*) and white and yellow violets (*Viola canadensis* and *V. pubescens*). A little later a native of more southerly climes, willow amsonia (*Amsonia tabernaemontana* 'Salicifolia') joins in with its steel blue stars.



In one of her beds McDonald grows four natives in the pea family, including the Carolina lupine, top, and false wild indigo, above.



A larger group nearby, also loved by hummers, contains species or descendants of four American legumes. This group is also shaded from late morning through early afternoon, though the shade is so light and our climate so cool that they'd probably do fine in full sun. The soil in this bed, while still very sandy, is relatively rich in humus.

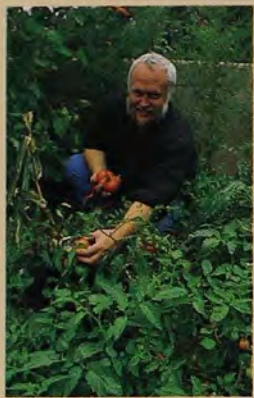
The season begins with a combination of lupines and long-spurred columbines. While I enjoy the many color combinations of the showy 'Russell's Hybrids' lupines, I'm also much taken with the more open spikes of their wild, blue-violet ancestor, *Lupinus perennis*. Both do surprisingly well in poor soil, though they thrive under richer conditions. With these bloom the lovely golden columbine (*Aquilegia chrysantha*), long-spurred columbine (*A. longissima*), and Colorado columbine (*A. caerulea*), plus some of their variously colored offspring.

After a long show in late spring and early summer, these give way to the three- to four-foot high false wild indigo (*Baptisia australis*). Its spikes of deep indigo blue pea flowers go beautifully with the yellow pea flowers borne on the five-foot spires of southern thermopsis (*Thermopsis caroliniana*) and three-foot spires of mountain thermopsis (*T. montana*). I deadhead the columbines and lupines to keep them from taking over the garden, but the green balloon seedpods of the *Baptisia* and the thin silver pods of the *Thermopsis* are too attractive to remove. They extend the season of interest by several weeks, since in our climate they ripen slowly.

Last in this group to flower is wild senna (*Cassia marilandica*), whose lush, almost tropical-looking foliage has been enhancing the garden since spring. The gold-and-brown pea flowers in the leaf axils are showy only when you're close, but wild senna is worth growing for the foliage alone. I'm told the four-inch seedpods are decorative as well, though they never have time to form here before frost cuts down the three-foot plants.

From mid- to late-summer the popular, icy yellow *Coreopsis verticillata* 'Moonbeam' glows below the pale pink spikes of *Sidalcea malviflora* 'Elsie Heugh', which

continued on page 21



continued from page 18 which grows about five feet tall for me, blooming clear blue on long narrow stalks in late summer or early fall. Among the penstemons in this section is one known only as Pen-

stemon "W8901," which was grown from seed collected in Wyoming by a local nurseryman. It is short, under one foot tall, and puts up stalks of breathtaking sky-blue flowers in early to midsummer. Also sky-blue are the flowers of the eight- to 16-inch-tall *Penstemon rydbergii*, although books describe them as dark blue to indigo.

In the middle and front of my dark blue bed are *P. glaber*, *P. neomexicanus*, and *P. strictus*, all purchased in flower since some seedlings bloom bluer than others. With them is the frost-tender perennial dwarf mealy-cup sage (*Salvia farinacea* 'Victoria'), which sends up 18-inch spikes of a satisfying dark violet-blue atop hairy gray-green foliage much of the summer.

In my lavender-to-purple bed a deep-grape-colored seedling of *Penstemon whippleanus*, which stands about two feet tall, is next to 'Chihuahua', a rare cultivar of *P. campanulatus*, the bell-flowered penstemon. *P. campanulatus* is supposed to be hardy only to USDA Zone 8 or so, but the seed from which my plant was raised, collected in Chihuahua, Mexico, has overwintered five or six years in its propagator's Santa Fe garden without special protection. It bears large rosy-violet flowers. I have fronted these plants with the 10- to 12-inch-tall lavender harebell, *Campanula rotundifolia*, which is native to most of the Northern Hemisphere and, given a bit of water, spills over into my paths. To the back is the tall, weedy, annual to biennial *Aster bigelovii*, a mass of lilac in the fall.

In a fragrant night-blooming bed near a bedroom window is Edna St. Vincent Millay's "dumb white nicotine" (*Nicotiana alata*), which by day lets her long flared snowy trumpets droop, but by night "wakes and utters her fragrance/In a garden sleeping"; the candy-scented night-flowering four o'clock, *Mirabilis longiflora*; and *Datura meteloides*, the infamous sacred jimsonweed, whose immense white trumpet flowers lie like gleaming UFOs under the moon. For color, the bed also holds 'Rose Elf', a *Penstemon barbatus* selection, half its parent's height and a pleas-



ROB SIMPSON

Aquilegia chrysantha, above, is a columbine native to the American Southwest; the poppy mallow, right, is naturally distributed from Missouri to Wyoming and south to Texas.



JESSIE M. HARRIS

ant chubby pink. It is backed by *Aster novae-angliae* 'Harrington's Pink', a tall, fall-flowering beauty that forms a shimmering mass of hundreds of tiny exquisite clear pink daisies.

In a front bed near the street is Maximilian sunflower (*Helianthus maximiliani*), which is an installation rather than a plant; once sited, it cannot be moved. It makes a beautiful dark green drought-tolerant hedge much of the summer, then come fall erupts into spires of perfect golden daisies. In front of it is the two- to four-foot *Penstemon floridus*, whose rose-colored flowers have been perfectly described by a local nurseryman as "guppy-shaped," and the two-and-a-half to three-foot *P. pseudospectabilis*, which blooms a startling lipstick-pink. Nearby grow the sweet sand verbena, *Abronia fragrans*, which bears white snowballs, scented of arbutus, spring to midsummer; the foot-high edible pink nodding onion, *Allium cernuum*; the spreading poppy mallow, *Callirhoe involucrata*, with its violent red-violet winecups; and purple coneflower, *Echinacea purpurea*, in both its rose and white forms.

In and among these Americans bloom many European and Asian adaptavars, but as water-rationing becomes an increasing probability in northern New Mexico, it

seems all in all a good thing that natives are taking up more and more room in my garden and my heart.

Rand B. Lee is co-editor of a new quarterly publication, The American Cottage Gardener.

SOURCES

- Agua Fria Nursery, Inc., 1409 Agua Fria, Dept. MO, Santa Fe, NM 87501-3507, (505) 983-4831, FAX (505) 983-3593. Southwest natives and adaptavars. Superb penstemon collection. Catalog free.
- Alpains, 32315 Pine Crest Court, Kiowa, CO 80117, (303) 621-2247 (no phone orders). Alpines, wildflowers. Catalog \$1.
- Colorado Alpines, Inc., P.O. Box 2708, Avon, CO 81620, (303) 949-6464. Alpines, Rocky Mountain wildflowers. Catalog \$2.
- Plants of the Southwest, Agua Fria, Route 6, Box 11A, Santa Fe, NM 87505, (505) 471-2212, FAX (505) 438-8800. Xerics, low and high desert natives. Catalog \$1.50.
- Prairie Seed Source, P.O. Box 83, North Lake, WI 53064-0083. Prairie natives and wildflowers. Catalog free.



CHRISTINE GARCEAU



Next year, McDonald plans to add leafy prairie clover, left, to her legume collection. Coneflower and oxeye, above, are among her most vigorous late-season bloomers.

continued from page 19

remind me of tiny hollyhocks. Behind these grows fragrant anise hyssop (*Agastache foeniculum*), with fluffy, dusky lavender flower spikes and violet-tinged foliage. Earlier in the summer, *Penstemon* 'Prairie Dusk' flowers nearby, and the gracefully hanging heads of nodding onions (*Allium cernuum*) grow up through the airy coreopsis foliage, blooming in shades of rosy lavender and white. Still earlier, the tiny iris relative, blue-eyed grass (*Sisyrinchium angustifolium*), opens its blue eyes to the sun. The anise hyssop, onion, and blue-eyed grass will self-sow freely if not deadheaded, though only the anise hyssop is large enough to cause problems.

Another late summer combination we enjoy is the soaring, rich violet-blue candlebrum of blue verbena (*Verbena hastata*) with the rusty red sneezeweed, *Helenium autumnale* 'Moerheim Beauty'. Both are tall and require rich, evenly moist soil; for us they grow well at the edge of a vegetable bed. Blue verbena also looks nice with mauve-pink cultivars of purple coneflower (*Echinacea purpurea*), though these are much more tolerant of dry soils. Purple coneflowers and red sneezeweed do not enhance each other, but the white form of coneflower, 'White Swan', is a fine, if short-

er, choice. Blue verbena also has a white form, though I've not yet found a source. Oxeye (*Heliopsis helianthoides* 'Scabra Hybrids') also helps close the season. In fact, the cultivars we grow seem to bloom forever.

A late season favorite here is a cross between two frighteningly invasive genera, asters and goldenrod. But the hybrid, \times *Solidaster luteus*, isn't the least bit invasive, and it produces its frothy pale yellow plumes in a most engaging end-of-summer show. We grow it with the later-blooming white boltonia (*Boltonia asteroides*). We have recently added to this group the sky-blue aster (*Aster azureus*), a clump-former safe for small gardens and busy gardeners. In the background is culvers root (*Veronicastrum virginicum*). Ours is the icy pale blue species, though we'd like to add the cultivar 'Roseum', in pale pink.

Everyone seeks a perennial that will bloom all season. In our climate, the quest begins and ends with various forms of the western bleeding heart (*Dicentra formosa*) and the eastern bleeding heart (*D. eximia*). Unlike the Asian *D. spectabilis*, which leaves a hole when it dies back in midsummer, the cultivars 'Adrian Bloom' (rosy pink), 'Bacchanal' (dark, muted rose), 'Langtrees' (white), and 'Silversmith'

(blushing white) all bear clusters of flowers over superbly glaucous foliage from frost to frost. There are many more cultivars, some quite painfully bright, others more subtle. In hot climates, they require some shade, but here in the cool north they thrive in full sun, given evenly moist, fairly rich soil.

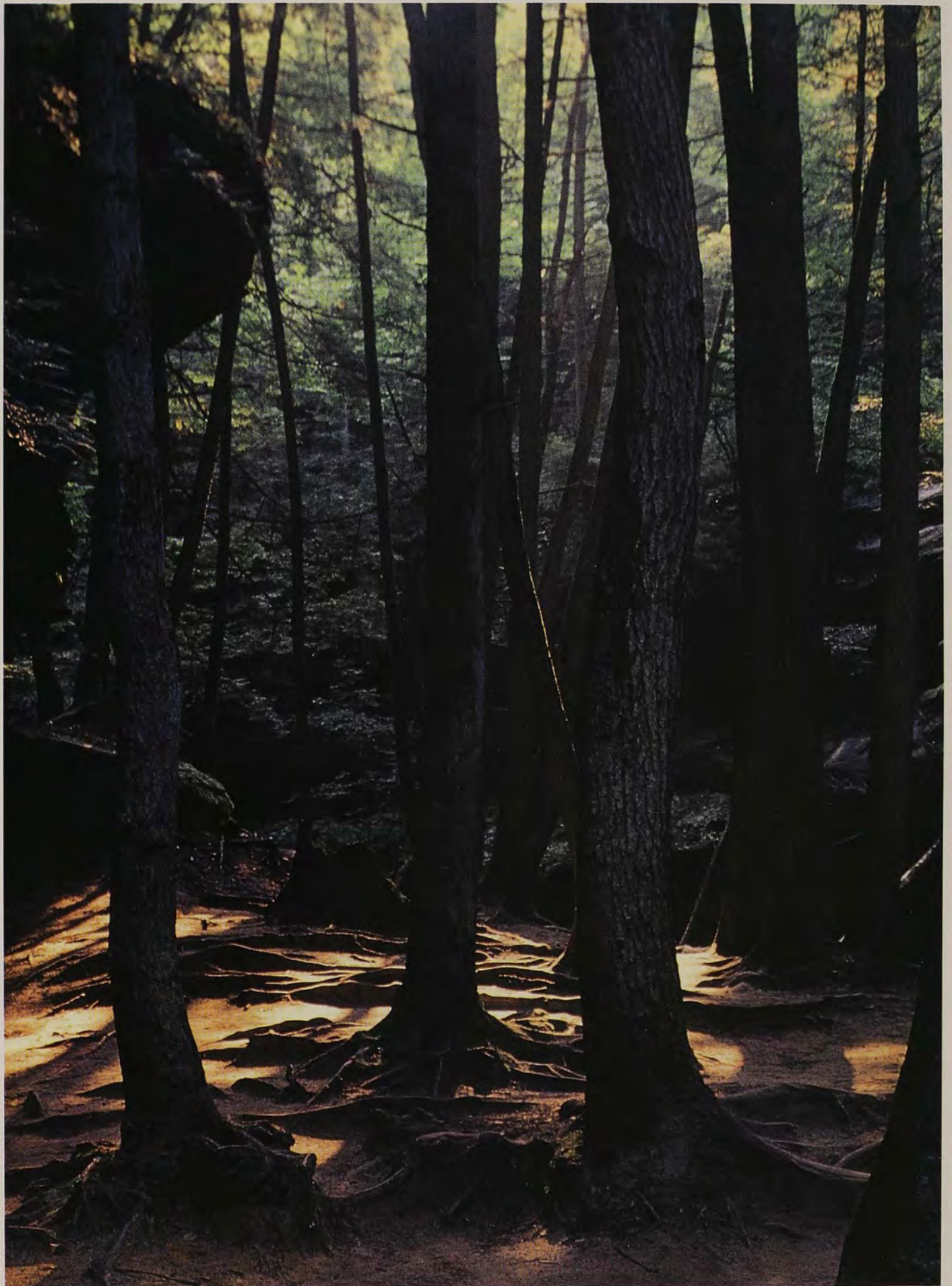
There are a great many more natives worth trying. Next year I plan to include another native legume, leafy prairie clover (*Petalostemum foliosum*). Its lacy, almost ferny foliage is lovely in itself. The mid-summer to late fall rosy purple flowers are a bonus. I'd like to try more penstemons and some clematises, and experiment with native annuals and shrubs. The longer I garden with natives, the better I like them.

Nancy McDonald is co-editor of a new quarterly publication, *The American Cottage Gardener*.



SOURCES AND RESOURCES

- The American Cottage Gardener*, 131 East Michigan Street, Marquette, MI 49855. This publication's goal is to help readers create a cottage garden anywhere in the United States or Canada using both traditional English cottage flowers and American natives with color, form, and fragrance that make them admirable substitutes. Subscriptions are \$35 a year (Canadian readers need to send U.S. funds); single copies are \$10.
- Busse Gardens, Route 2, Box 238, 635 East 7th Street, Cokato, MN 55321, (612) 286-2654. Bleeding hearts, *Sidalcea*, \times *Solidaster luteus*. Catalog \$2.
- Forestfarm, 990 Tetherow Road, Williams, OR 97544, (503) 846-6963. Agastache, columbine, *Thermopsis*. Catalog \$3.
- Heronswood, 7530 288th Street NE, Kingston, WA 98346. Agastache, columbines, bleeding heart, \times *Solidaster*. Catalog \$3.
- J. L. Hudson, Seedsman, P.O. Box 1058, Redwood City, CA 94064. *Sisyrinchium angustifolium*. Catalog \$1.
- Milaeger's Gardens, 4838 Douglas Avenue, Racine, WI 53402, (414) 639-2371. Asters, bleeding hearts, coneflowers, lupines, many others. Catalog \$1.



PHOTOGRAPHS BY RICHARD L. DUBÉ

Natural Inspirations

Try looking to nature for landscape ideas.

B Y R I C H A R D L . D U B É

Good landscape designers are always on the lookout for inspiration that will add to the quality and scope of their work. By traveling and visiting the sites of a variety of public and private landscapes, professionals add to their repertoire of ideas and find new ways of merging old concepts to produce original approaches. There is another source for design concepts close at hand, however, as easily accessed by the amateur as by a professional with the most impressive connections and lavish budget. All that is required is looking at things in a different way.

This font of inspiration is the natural world. It is the ultimate source of everything we use or consume, and all of our actions are reflective of its intricate systems and patterns. Usually we are too deeply immersed in those patterns to notice them.

A term used to describe the process of rediscovering the designs within the natural world is "pattern language." The term was coined in the title of a 1977 book by architect Christopher Alexander, who was looking for a more organic approach to the understanding of architecture as it relates to both natural and historic patterns. In looking at natural patterns, he took his inspiration from such things as the branching of a tree or the way organisms develop, becoming more differentiated as they grow.

It is difficult to know where to begin the design process without some basic guiding principles. Pattern language aids you in observing nature, so that you find clarity and reason in what at first appears to be a chaotic environment. It could be thought of as a linear approach to a non-linear world. This approach also helps you quantify design



A natural grove of trees in Hocking Hills State Park in Ohio, opposite, represents a natural pattern for a design that is copied in artificial forms such as pergolas, arbors, and colonnades. In some cases, such as this urban landscape in Phoenix, Arizona, above, the pattern is copied outright in a contrived manner that appropriately reflects the needs of the site.

goals and objectives. You can use these patterns to solve a particular problem, or use them for overall inspiration.

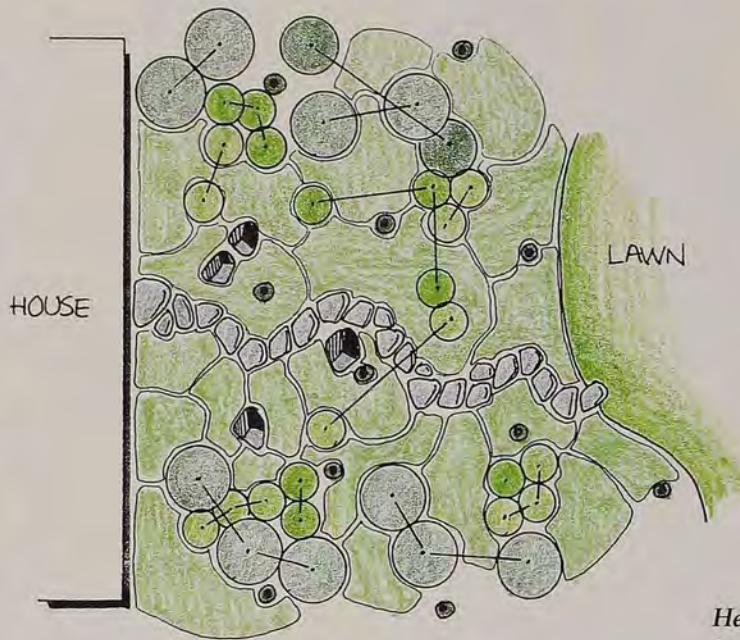
There are many natural patterns that have been recognized and expressed in artificial forms—not just in architecture, but in practical items we use in our daily lives. For example, Velcro fasteners are said to have been inspired by a Frenchman who noticed how tightly the seeds of the burdock adhered to his pants. Upon examining the seeds, he discovered that they were formed like tiny hooks. One side of a Velcro strip consists of hooks, the other of tiny loops.

Even when we don't need a magnifying glass to see them, the connections between natural patterns and manmade objects may not be readily apparent. The same may have been true for those who first copied them; their use may have been the result of sudden serendipitous insight rather than a conscious effort to solve a design problem.

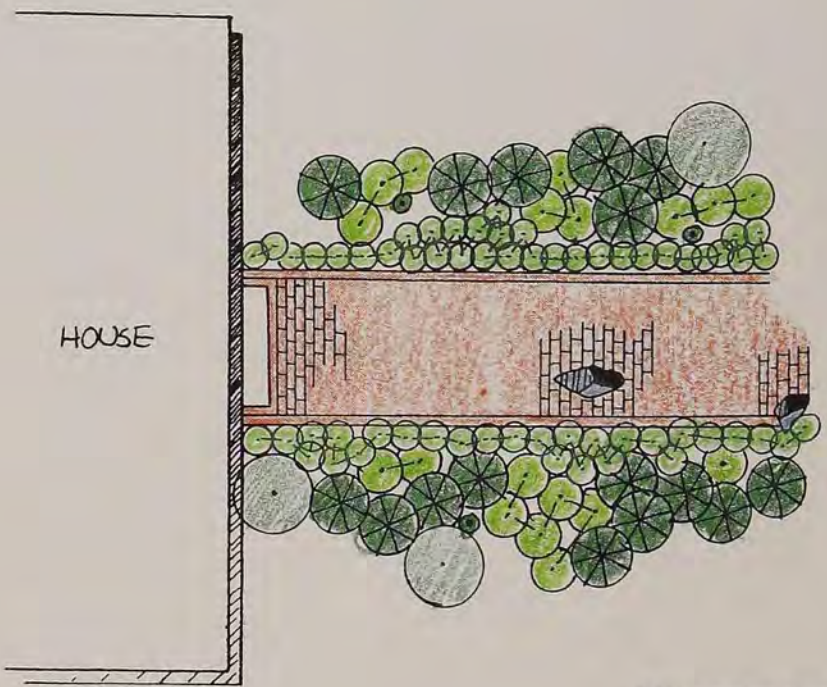
Spider webs, for example, offer insights into engineering principles that could fill a textbook and may have inspired inventions ranging from lassos to ladders and suspension bridges.

Nature is said to be the inspiration for the Crystal Palace, the famous conservatory designed by Sir Joseph Paxton for the Great Exhibition in London in 1851. According to Felix Paturi, in his 1976 book *Nature, Mother of Invention*, Paxton's model for supporting the vast expanse of glass—at 1,848 feet long and 408 feet wide, it was four times the size of St. Peter's in Rome—while retaining a delicate appearance was the royal water lily, *Victoria amazonica*, which he had grown as gardener for the Duke of Devonshire. The water lily's huge leaves, which can be up to six feet in diameter, are supported on the underside by ribs that radiate from the center like wheel axles, then fork into smaller branches at the leaf-edge. Flatter "struts" bind these ribs to each other.

One natural principle that has been consciously copied for centuries is the golden mean, discovered by 13th-century mathematician Leonardo Fibonacci when comparing the mating of rabbits to the number of offspring they produced. The Fibonacci sequence, as this ratio of .618033 came to be called, mathematically describes many seemingly unrelated natural phenomena—the placement of leaves or twigs on a stem, the curve of a parrot's beak, the spiraling chamber of a nautilus, the seed head of a sunflower. The eye-pleasing golden rectangle, which reflects this ratio in the rela-



Here a grove-of-trees pattern is used as a transition between a house and lawn.



The running river is a pattern useful for a more formal setting.

ILLUSTRATIONS BY RICHARD L. DUJBE

tionship of its length and width, can be seen in the shape of playing cards and the Parthenon in ancient Greece. Romantic-era artists used it to place the focal points of their paintings, in order to be faithful to the pattern “laid out by God.”

Asian cultures have long drawn upon nature to inspire their designs. In their gardens, this allows the visitor to be a participant, being transported mentally to a different space and time, and results in a sense of tranquility and contemplation.

In China, you can travel to specific sites that served as models for painters and, subsequently, landscape designers. The Li River of Guilin in south-central China is one of the best-known of these. Its towering limestone cliffs can be found duplicated in miniature in gardens throughout the country—an example of replicating natural landmasses in smaller forms. These Chinese gardens incorporate pathways adjacent to these “cliffs” and “rivers,” sometimes even leading into artificial caves. From the top of these cliffs a gardener can emulate the recluse who climbs a mountain to meditate and glean inspiration from the scene below.

The Japanese are also adept at incorporating natural forms and patterns into their gardens. One outstanding example is “tapestry” hedges, in which shrubs of varying textures and colors are planted in a mass and pruned to a single vertical plane. This technique is intended to mirror the way lines of trees overlap on distant hills, creating a foreground, midground, and background in a relatively shallow space.

Other forms the Japanese have used to inspire their gardens are crashing waves, copied in their raked gravel gardens; the solitary island, reflected in stones jutting from earth or water; and snow-viewing elements such as stone lanterns, intended to hold snow where it can be contemplated, sometimes reflected in a body of water.

Generally, as you look for inspiration from the natural world, you will want to look at where you are. The best solutions tend to be the ones close at hand. If you are living in New England it would be best to use its land or plant forms. If you live in Arizona, you would look to the geology and botany of the desert. And don't forget to examine micro-patterns, which are often a reflection of the larger forms. In the veins of a leaf, for instance, we can see the branching of a tree or a river system. In lichens on a stone, we can imagine rocks in a stream.

You can use these patterns in two ways.



PHOTOGRAPHS BY RICHARD L. DUBE

Limestone monoliths on China's Li River, top, inspired artists whose work ended up in Japan. It is unlikely that Muso Kokushi, who designed the dry landscape above at Tenryuji temple in Kyoto, Japan, in 1339 A.D., ever visited the Li River, yet the monolith pattern is evident.

You may have a favorite natural site or design that you want to replicate in your own landscape because of the pleasure it gives you, or you may have a particular landscape problem for which any one of several natural patterns may offer a solution.

How would you begin to transform your own garden using natural sites and patterns? The first step is to ignore the details and look for a way to describe in words what you are looking at. That will help you organize your thinking about the pattern and its applications.

For example, there is the pattern I call the “arcing stream,” represented in nature

by a creek or narrow river meandering along a shore. When we look at it, normally from an oblique perspective, we see a number of characteristics: a sweeping curve that repeats itself; a contrast of texture between water and land; a bank of varying heights relative to the water; and often a bulky mass of shrubs or other vegetation to the extreme land side of the arc. The arcing pattern creates a feeling of movement and a sense of direction, while the bulky mass conveys a sense of anchored strength. Applications that suggest themselves include arcing planting beds, walkways and paths, and decks and patios. As you look at a pattern in na-

ture, you might want to sketch it, trying to capture its proportions, textural differences, and other clues that help define what you are seeing.

I used this pattern with one client who wanted a way to reach her yard from her higher-level patio without using steps or stairs. A conventional ramp would have consumed too much room in the small yard. We solved the space problem by compressing the ramp into an S-shaped curve. The stream banks were reflected in stone wall ellipses, and strategically placed shrub beds against grass gave us textural contrast. The bulky mass was a solitary tree at the head of the ramp.

Another client had a rectangular deck that took up one whole side of his house and looked out onto a river in a spectacular salt marsh setting. Local building code required a railing for the deck since it was three feet high, but this would have detracted from the use of the deck and from its view. We made the house itself the "bulky mass," with the decking flowing around the house. To eliminate the need for the railing, the deck was built with two levels, and the steps between the two became the bank. We added a bench running the length of the deck to finish framing the view, and completed the S-curve with stairs to the deck at the front of the house. The bulky mass inside this curve is *Miscanthus*, mimicking the natural grasses of the salt marsh, just as the deck mimics the arc of the river through the marsh.

Another common pattern is what I call "emergence." In nature, there are rarely any hard edges or boundaries. If you look up at the canopy of a tree, you will see nothing but leaves near the trunk, and farther out, nothing but the sky. In between, however, you see individual leaves contrasting against sky. This same observation applies to ocean and shore, sand and grass, field and woods, and many micro-patterns seen in nature. Some things you may observe about these transitional situations are that they have contrasting textures, that each of the different elements has its own internal continuity, and that one element is often more random than the other.

In designing your home landscape, rather than butting one element right up against another, it is sometimes more appropriate to include elements of both in a transition zone. Some applications for this emergence pattern include blending hardscaping and softscaping, blending two different walkways, and lighting a landscape. For instance,

if you have an informal stone walkway abutting a formal brick walk, you could incorporate some of the stepping stones in the brick walk. This helps the eye flow naturally from one element to the other.

Let's look at some other useful natural patterns as they might be applied to a single design problem: creating a transition zone between your backdoor and your backyard. Possibilities include a path, a deck, a pergola, or an elevated walkway.

If you want a path, there are a number of natural patterns to serve as your model. The pattern you choose will guide your selection of material for the path, the plants that surround it, and the placement of both. You can think of the plants you use as sculptural elements used to re-create the body and details of the natural pattern form you choose.

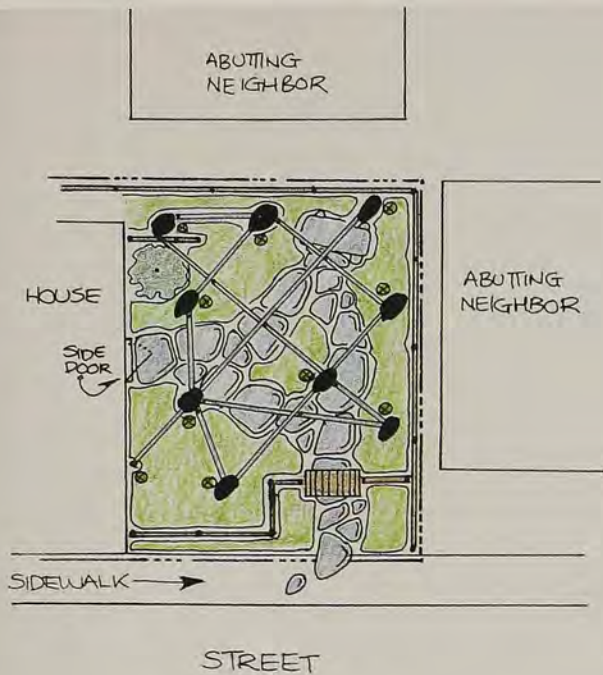
If you have a two- or three-story house, or one that is "natural" in appearance such as a log cabin or cottage, you might want to use a pattern I call "grove of trees." This pattern is characterized by a random placement of vertical elements alongside a meandering path. The path should be of informal stone or mulch, surrounded by shade-loving ground covers and bulky shrub masses that increase in height moving away from the path, to create a feeling of depth. One possible combination of plants that could be used in New England would be birches as vertical elements (palms could serve the same function in Florida or Southern California), hay-scented ferns (*Dennstaedtia punctilobula*) and bunchberry (*Cornus canadensis*) as ground covers, with ostrich ferns (*Matteuccia* spp.) as accent plants and mixed azaleas as shrub masses.

If there is a slightly descending grade away from the house, the "mountain top" pattern can be used with any style of architecture, and can be formal or informal depending on your need. Here, a hard-surface path descends through a series of open spaces with random low shrub masses and ground covers helping to define the pathway. Occasional small trees provide framed views and help create a greater sense of middle ground. Stone or brick work well for the path surface, and a nice addition is small to medium-sized patios as the open spaces. Plant combinations here in New England could be Japanese tree lilac (*Syringa reticulata*) or hawthorn and dwarf Korean lilac (*S. meyeri* 'Palibin'), 'Purple Gem' rhododendron or 'Crimson Pygmy' barberry. Ground covers might be barren-



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Leaves in water at Pemigewasset Wilderness area in New Hampshire, top, show an emergence pattern of congregation and separation similar to leaves growing on a tree. The natural stone path, above, leading into a courtyard garden in this residence in Falmouth Foreside, Maine, merges with a formal concrete paver path that leads to the front door.



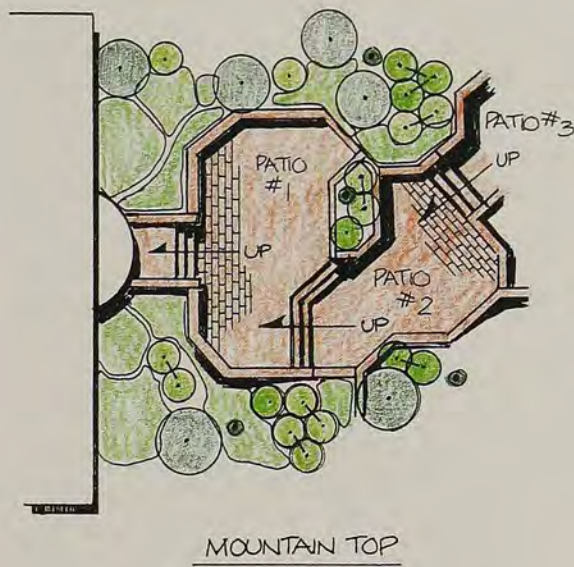
A grove of trees is echoed in a pergola, whose design can be modified according to space and financial resources.

GROVE OF TREES
USING MODIFIED PERGOLA

ILLUSTRATIONS BY RICHARD L. DUBÉ

- MIXED VINES
- STONE COLUMNS
- PIPE
- SHRUB
- FIELDSTONE
- FENCE
- GROUNDCOVER/PERENNIALS
- STONE BENCH

Patios on three levels are inspired by plateaus that might be encountered on a walk down from a mountain top. The plateaus could also be a series of open spaces.



- SMALL TREE
- SMALL SHRUB
- MEDIUM TO LARGE SHRUB
- GROUNDCOVER/PERENNIALS
- LOW-WALLED PATIO

wort or variegated bishop's weed (which needs an annual mowing after flowering). Elsewhere in the country, consider native or exotic plants from mountainous regions with a similar climate.

The form I call the "running river" is broad and flat with bankings, bounded either by fields or woods. This pattern could best be used where you want to move quickly from the house to an outdoor living space. If your backdoor is usually shaded and you enjoy the sun, this type of path pulls you quickly to that area both visually and physically. The straight, formal path could be bluestone, brick, concrete pavers, or even fieldstone. It is typified by low shrubby masses or benches defining the "bankings." Behind these rise random clumps of additional shrub plantings and an occasional tree. If you are using a small scale you could use boxwood (a large prickly pear—*Opuntia*—species could serve this function in a desert environment) and a mixture of dwarf spirea and 'Wardii' yew (*Taxus x media* 'Wardii') as shrub masses. A serviceberry or shadbowl (*Amelanchier* sp.) in the East or a desert willow (*Chilopsis linearis*) in the West could be the occasional tree. You could even imbed a different-colored stone in the path to mimic the small islands that sometimes occur in rivers.

These are only a few of thousands of natural pattern languages that can provide beautiful solutions to design problems. Observe nature closely. Describe what you're seeing. Define its elements. That is how Fibonacci discovered his mathematical sequence. Pattern language may become the golden means to creating your own very personal and satisfying landscape.

Richard L. Dubé's landscape design and consulting business, *Environmental Information & Design*, is in Buxton, Maine.

RESOURCES

- Nature, Mother of Invention* by Felix Paturo. Harper and Row, 1976.
- Orion Nature Quarterly*. "Nature by Design," winter 1993. Single issues \$5. Write the Orion Society, 136 East 64th Street, New York, NY 10021. This publication addresses the environmental crisis and reuniting people with the natural world.
- A Pattern Language: Towns, Buildings, Construction* by Christopher Alexander, Oxford University Press, 1977.

*A honey bee fills its
pollen basket during
a stop on a tansy.*



What's the Buzz?

Honey bees are not only fascinating,
but they increase our yield of food crops and seeds.

BY ANNE WESTBROOK DOMINICK

LITTLE CALMS A STRESSED SOUL MORE THAN THE BUZZ OF A FEW HARD-WORKING HONEY BEES fussing about in the depths of some wide-open flowers. From the bright red tips of maples overhead to azure crocuses underfoot, bees herald spring's earliest moments. After humming through summer's long hot hours, their task force finishes off the year in our witch hazels (*Hamamelis* spp.) and Michaelmas daisies (*Aster* spp.) while we prepare our garden beds for the winter.

Bees don't exist just to serenade us humans, of course. While the honey they make is certainly a bonus, they also perform a task essential to the continuation and diversity of our floral species: they pollinate plants. To discourage self-pollination—incestuous male and female contact within a single flower—blooms have evolved into forms that make it impossible. Most cross-pollinate—that is, their pollen, and the genetic information it carries, must be transported from one plant to another.

PLANTS FOR BEES

Here are a few ornamentals that tickle the fancy of *Apis mellifera*, listed in order of blooming from winter through fall.

COMMON NAME	BOTANICAL NAME	COMMON NAME	BOTANICAL NAME
WILLOWS	<i>Salix</i> spp.	HOLLIES	<i>Ilex</i> spp.
SPRING HEATH	<i>Erica carnea</i>	THYMES	<i>Thymus</i> spp.
SNOWDROPS	<i>Galanthus nivalis</i>	BACHELOR'S-BUTTON	<i>Centaurea cyanus</i>
CROCUSES	<i>Crocus</i> spp.	BASSWOOD OR LINDEN	<i>Tilia americana</i>
MAPLES	<i>Acer</i> spp.	BUSH CLOVER	<i>Lespedeza</i> spp.
SPICEBUSH	<i>Lindera benzoin</i>	MINTS	<i>Mentha</i> spp.
DOGWOODS	<i>Cornus</i> spp.	BORAGE	<i>Borago officinalis</i>
REDBUD	<i>Cercis canadensis</i>	MALLOWS	<i>Malva</i> spp.
ROSEMARY	<i>Rosmarinus officinalis</i>	PURPLE CONEFLOWERS	<i>Echinacea</i> spp.
MAGNOLIAS	<i>Magnolia</i> spp.	VERVAINS	<i>Verbena</i> spp.
PEA TREES	<i>Caragana</i> spp.	GOLDEN-RAIN TREE	<i>Koelreuteria paniculata</i>
OREGON GRAPE	<i>Mahonia aquifolium</i>	EVODIA	<i>Evodia danielli</i>
FRUIT TREES	<i>Prunus</i> and <i>Malus</i> spp.	FIREWEED	<i>Epilobium angustifolium</i>
TULIP POPLAR	<i>Liriodendron tulipifera</i>	SUMMER-SWEET	<i>Clethra alnifolia</i>
SOURWOOD	<i>Oxydendrum arboreum</i>	TRAVELLER'S JOY	<i>Clematis vitalba</i>
BLACK LOCUST	<i>Robinia pseudoacacia</i>	MORNING GLORIES	<i>Ipomoea</i> spp.
HONEY LOCUST	<i>Gleditsia triacanthos</i>	MARJORAMS	<i>Origanum</i> spp.
FORGET-ME-NOTS	<i>Myosotis</i> spp.	SAGES	<i>Salvia</i> spp.
SNOWBERRIES	<i>Symphoricarpos</i> spp.	TEASELS	<i>Dipsacus</i> spp.
PENSTEMONS	<i>Penstemon</i> spp.	SUNFLOWERS	<i>Helianthus</i> spp.
FALSE INDIGO	<i>Baptisia</i> spp.	ANISE HYSSOP	<i>Agastache anethiodora</i>
SALAL	<i>Gaultheria shallon</i>	MOUNTAIN MINT	<i>Pycnanthemum pilosum</i>
VIRGINIA CREEPER	<i>Parthenocissus quinquefolia</i>	GOLDENRODS	<i>Solidago</i> spp.
LAVENDERS	<i>Lavandula</i> spp.	MICHAELMAS DAISIES	<i>Aster</i> spp.
INDIAN BLANKET	<i>Gaillardia pulchella</i>	GARLIC CHIVES	<i>Allium tuberosum</i>

Breezes can whiff the light fluffy pollen in the inconspicuous flowers of plants like grasses and corn as far away as needed, but most plants with heavier pollen rely on insects to spread their pollen from flower to flower. Such plants have evolved complex biological and chemical advertisements of a sweet nectar reward, which entice insects into the unwitting role of middlemen in these floral assignments. In these plants, oily pollen on the anther—the pad at the tip of male reproductive structures called stamens—sticks to an insect's body as it rubs against the anther on the way to sweet liquid exuded by nectaries at the flower's base. When the insect moves to another plant, some of the pollen it carries adheres to the stigma—the sticky pad at the end of the female reproductive organ called the pistil. From there the pollen grains grow a tube down through the pistil into the flower's ovary, through which sperm passes to fertilize each ovule. In this phenomenon lies the incredible importance of the honey bee.

First, while hundreds of insects love nectar, bees depend on flowers for all their food: carbohydrates from the nectar, fat and protein from pollen. Second, honey bees practice "flower fidelity." A worker

that starts collecting from plum trees will continue in plum trees for the rest of that trip. A honey bee in dandelions beneath the trees will work only in dandelions. Those that arrived at the strawberry patch will stick to the strawberries. Other insects move from species to species and care not about the mix-up. With honey bees, we can depend on pollination. While collecting their own foods, they fertilize flowers of the crops that feed the world—researchers estimate that the common domestic honey bee (*Apis mellifera*) pollinates about \$10 billion in crops annually.

In our own yards, on a more limited scale, honey bees do the same for us. In addition to pollinating almost all fruits, from full-sized apple trees to ground-hugging blueberries, they collect from vegetables, herbs, and ornamentals. The year I finally moved my hive near the vegetable garden, the cucumbers, cantaloupes, and summer and winter squash kept producing, and producing, and producing. Any time throughout the summer that I walk into the garden, a few bees will be buzzing deep down in the big yellow blossoms. I've planted another of their favorites, the blue-flowered borages—different flower colors are more attractive to certain nectar collec-

tors; honey bees are especially attracted to blues and purples, while hummingbirds favor reds—here and there through the vegetable patch to further ensure their visits.

Having a hive nearby practically guarantees a good crop of flower seeds. Every year I collect cleome, cosmos, poppy, and nasturtium seeds for next year's plantings. Self-seeding herbs such as chervil, caraway, motherwort, and rue have so established themselves that they have to be thinned every spring.

A new hive in a new spot takes some planning. A young colony is best started in spring so it will have the entire season to build up a strong brood with plenty of honey to get through the winter. (There is almost never enough honey to harvest the first year.) As much as we might enjoy bees in our gardens, their hive should be placed out of the way, where its main exit and entrance path won't cross one of our own. Honey bees are mild tempered, but they can feel threatened when encountering humans along their route to and from home.

The fact that bees work constantly to keep their hive a steady 92 degrees should influence where we put it. In summer, special workers fan constantly and others bring in water for cooling evaporation. In



ANNE WESTBROOK DOMINICK



ROB AND MELISSA SIMPSON



A honey bee swarm, top, makes an awesome sight, but its collective consciousness is focused on homing, not stinging. Late-season bloomers favored by bees include teasel, left, whose spiky seedheads remain decorative through fall and winter, and fireweed, above, which develops capsules that open to show seeds with feathery hairs.

A (SOMETIMES) PAINFUL TOPIC

Honey bees rarely sting. When collecting in the field, they would rather flee than protect the richest blossoms. When swarming, their collective mass is far more interested in starting a new hive than bothering with humans. Only when they fear that their home is under attack will they strike. Even then, as few as deemed necessary take part in the battle, for once a honey bee stings, it dies.

Other stinging insects are the real villains. I've been stung by all except the bumblebee (which is about as mild tempered as any beast can be, but supposedly packs a mighty wallop when pushed beyond its limit), and I agree with the experts that wasps, hornets, and yellow jackets cause far more pain than the honey bee. The long, slender, shiny black paper wasps, which would as soon live inside the house as out, seem to enjoy surprise stinging. Their hits often swell and ache for several hours. Yellow jackets, those vicious hole-in-the-ground dwellers, operate in groups of half a dozen or more. They attack quickly, repeatedly, and they hurt. Hornets, if at all aggravated, emerge en masse and chase their tormentors fairly long distances. They, like the others, will sting repeatedly and live to sting again.

By comparison, when beekeepers dismantle hives to collect honey, honey bees are little more than a slight annoyance. To keep trouble to a minimum we wear a veil over our heads, long gloves, and a loose white or yellow cotton shirt or coverall tucked in around the ankles. (Wool and dark colors incite bees.) To tranquilize the bees, we pump smoke around the hive and work at a steady, deliberate pace. We actually expect occasional stings and find that after working around hives for a short time, the stings become barely noticeable—a prick as mild as a tetanus shot given by a skilled nurse.

Between one-half and one percent of the population is severely allergic to the stings of honey bees and other members of the Hymenoptera family. For them, an excessive production of antibodies in response to an earlier sting causes them to react to subsequent stings with swelling of the face, nausea and dizziness, and bronchial constriction. If this happens to anyone, particularly a child, an allergist should be consulted. About 50 Americans die each year from such reactions, and it's impossible to predict when a reaction will be mild and when it will be severe. Obviously, a person with such an allergy should not become a beekeeper. (People who have had sting allergies diagnosed usually carry a medication that they can inject to neutralize their body's reaction to a sting.)

Most of us suffer no more than a brief swelling. As we work with bees and receive an occasional sting, swellings eventually cease to occur even when we're stung in such tender places as the eyelid or lip.

There are real reasons for concern about the African, or so-called "killer" bees that have migrated north through Central America and across our southern borders. These bees tend to claim a larger territory than honey bees and sting as a group, often inflicting hundreds of stings at a time. They can move into existing honey bee hives and leave a queen that will produce a more belligerent brood as the current hard-working, mild-mannered residents die off. But by replacing queens with known honey bee queens every year, beekeepers are keeping the threat in check. In most of North America, African bees should never be a problem, since they cannot survive our winters.

—Anne Westbrook Dominick

winter they huddle in one compact mass that is constantly rotating from deep in the interior to the outer surface and back. A site in which deciduous trees offer some afternoon shade in summer—especially in the South—and full sun in winter will give them help with climate control in both seasons. Because cold winds lower the temperature more quickly than a more frigid calm spell, a windbreak to the north will help them through the winter. A stand of evergreens or an outbuilding or tool shed will do the trick quite nicely.

Ideally the hive's opening faces south to give workers the longest possible day. Next best is the east for the earliest sun and the quickest warm-up. Light shade during the hottest part of a summer day is okay, but in order to work from early morning to late afternoon, bees need full sun most of the day. Full shade will shut down the hive.

If no pond or stream is within a half mile, bees appreciate a small container of water, such as a birdbath, with plenty of floating chips or cork on the surface for

landing. Yet it is essential that the hive itself be kept dry. Raising the hive off the ground a few inches with cement blocks or a wooden stand will prevent decay, keep the hive warmer in winter, and prevent vegetation from blocking the entrance.

The landscaping in the vicinity of the hive can do a lot toward governing the bees' behavior. Although you want to avoid blocking the sun, an eight- to 12-foot-high hedge around the grounds will make the workers fly up and over it on the way to favorite fields, thus decreasing the likelihood that they will travel along people's walkways. My hive is set on a south-facing slope looking over my vegetable garden. East, south, and west of my cleared acre lot is a deciduous woodlot. While a couple dozen honey bees may drop into the garden, the others rise straight up and pass over the trees to get to their favorite sources.

Even fairly large home gardens cannot supply enough nectar to satisfy even one hive. They need acres. The 40,000 to 50,000 workers (all non-reproducing females), couple hundred drones (non-working males), and one queen, need 500 to 600 pounds of honey per year for themselves. One worker on one trip, which can be up to three miles long, will collect from as many as 100 to 1,000 flowers of the same species. Workers can fly a total of 50,000 miles just to collect one pound of honey. Even the richest gardens can't supply that.

On the other hand, we can plant some of their favorite plants (see sidebar, page 30) to entice a few to work in our yard. Honey bees like hundreds of species, and one of beekeeping's rewards is that it teaches us a lot about various flowers. For example, I thought the bee balm (*Monarda didyma*) would be a honey bee treat, but after I planted it, I could see that their tongues are too short to reach its nectar. Bee balm was named for the bumblebees that work a good stand by the dozens. On the other hand, honey bees will devour the sweet drinks from another genus member, the horsemint (*M. punctata*).

Favorite plants don't need to be next to the hive. Scouts survey the entire area to pinpoint the richest offerings. Yet on cloudy or cool days they much prefer working closer to the hive.

Dandelions begin blooming here at a time when we often have many gloomy days, and those who can be relaxed about their lawn's make-up, as I am, will want to



let them stay, since they are a reliable, lush, and nearby nectar source. Poor dry sections in a yard are ideal for wild thyme (*Thymus serpyllum*), and a lawn seed mix with short clovers in the standard grass crop will delight the workers.

Any wasteland in a yard can be turned over to a nectar-rich ground cover. Any clover—a flower that yields one of the universal, all-time favorite honeys—or alfalfa will both enrich the soil and treat the bees. Goldenrods will aggressively take over large plots, brighten the days as fall arrives, and, from my experience, make an exciting honey that soothes a sore throat like nothing else. Wild gardeners who can enjoy even plants that are usually considered a nuisance will find that bees love the pretty beggar-ticks (*Bidens* spp.) that will happily fill in abandoned areas.

During the warm days in February and March, honey bees really benefit from strategic planting. On the few days when temperatures reach 55 degrees, many will work at cleaning the hive while a few of the hardiest will prowl out a half mile or so looking for fresh pollen and nectar. (Pollen is important in spring when the production of young gets under way, since those in the larval stage are primarily fed pollen.) The earliest crops are undoubtedly the various pussy willows, which prefer a damp growing area but once established will bloom winter after winter. Because they put on their show here at a time when snow may still be on the ground, we love them, as do the hungry honey bees. In



Flowering shrubs that attract bees in spring include pea trees like the weeping Siberian pea shrub, top, and our native spicebush, above.

March, soon after the willows bloom, the sap of maples starts running and their bright red tips open, so that on warmish days the air overhead fills with a busy peaceful buzz.

One of the greatest benefits of having your own bee hive is, of course, the ability to harvest and enjoy the unprocessed honey. About four percent of fresh honey is esoteric materials, including pollen from various plants, which provide its distinctive color, scent, and flavor. Most of the vitamins in honey are due to its pollen content. While honey remains edible for decades, those delicate flavor combinations disappear within months.

Bees will visit whatever blossoms are most profuse and yielding nectar most copiously. As gardeners, what we supply is an isolated source that will bring a few in around us to ensure bountiful fruit and vegetable crops and prolific amounts of seed for next year's flowers.

Anne Westbrook Dominick is a free-lance writer, gardener, and beekeeper in Hinsdale, New Hampshire.

RESOURCES

The ABC and XYZ of Bee Culture. A bible of beekeepers. \$25 plus \$4.20 shipping and handling. A. I. Root Company, P.O. Box 706, Medina, OH 44258, (800) 289-7668.

Beekeeping in the Midwest by Elbert R. Jaycox. Great for beginners in that part of the country. \$5.50. Publications Office, 67 Munford Hall, 1301 West Gregory, Urbana, IL 61804. Make checks payable to the University of Illinois.

The Bee-Man of Orn by Frank R. Stockton is a children's book recently reissued with illustrations by Maurice Sendak. \$4.95 paperback, \$8.95 hardcover. Harper-Collins Children's Books.

A Book of Bees by Sue Hubbell. This paperback by the author of *A Country Year* is less a how-to than an exploration of the rhythms of country living. Priced at \$8.95 from Ballantine Books, New York.

The Dancing Bees by Karl von Frisch. A bee book that is enjoyable to read and popularizes some of the work that earned the author a Nobel prize.

Starting Right with Bees. A slim introductory paperback. \$7.99 plus \$4.20 shipping and handling. Also from A.I. Root.

Knotty But Nice

Species pelargoniums' odd posture makes them the Quasimodo of windowsill plants.

B Y T O V A H M A R T I N

Heaven knows, I have never been a great fan of botanical “freaks of nature.” The contortions and deformities exhibited by certain cacti do not excite me in the least, and the swellings of caudiciforms leave me cold. But somehow, the swollen stems and knobby joints that adorn species pelargoniums are a different matter entirely. The lower sections of species pelargoniums are a tad homely, perhaps. But perched on top of those plump, gnarled stems and brittle, strangely shaped leaves stand umbels bristling with reassuringly familiar flowers. The base looks like something out of a science fiction movie; the blossoms look like something your grandmother grew on her windowsill—these plants are a delightful contradiction in terms.

If you're scratching your head and wondering what on earth I'm talking about, it's little wonder. First of all, “pelargonium” is not a household word, not in this country anyway. And yet you've undoubtedly encountered pelargoniums at every street corner—masquerading under the name “geraniums.” In fact, pelargoniums were classified as geraniums by Linnaeus and the scientists that followed until 1789, when the French botanist Charles-Louis L'Heritier de Brutelle established *Pelargo-*

nium as a separate genus within the Geraniaceae family. The tender South African species and their hybrids were called pelargoniums, distinguished from the hardier geraniums such as herb Robert (*Geranium robertianum*) that grow wild in our woods. The British eventually adopted the new-fangled name. But 200 years later, Americans are still stubbornly clinging to the nickname geranium, much to the confusion of everyone.

Compared to the pelargoniums that carpet cemeteries on Memorial Day and line up dutifully in window boxes later in the season, species pelargoniums have received scant attention. To be sure, their blossoms aren't quite as riveting as the brightly colored, round-petaled crowd pleasers that bristle atop their cousins. But species pelargoniums definitely have a certain charm. Part of their beauty lies in the fact that they are eminently suitable for growing on the average windowsill. They are just the right size and they thrive in just the right atmosphere to share our living quarters comfortably.

I like to think of the species pelargoniums as the Rumpelstiltskins of the Geraniaceae. If you like streamlined plants that can be shaped into neat mounds with predictable curves, these are not the botanicals of your dreams. Species pelargoniums



TOVAH MARTIN

tend to be bent in places; their stems come out at weird angles and jut awkwardly into the air. Some trail down and form clumps of sorts, but even the most compact species sport blossoms that dangle akimbo on long, wiry stems.

Besides their similarity in blossom structure, species pelargoniums share few physical traits. Many—but not all—are tall with large, segmented leaves on woody stems that look ages old, even when they've only been propagated a few months previously. They all have a succulent quality to their appendages. And, in fact, species pelargoniums are often featured in catalogs of succulents. The stems are often swollen, scaly, rough, and capable of storing water in a drought, and the leaves are generally furry and brittle—obviously engineered to take a beating from sun rays. The beauty of these pelargoniums lies in the checks and balances they've developed as survivors.

If species pelargoniums ever had a yearbook in which one was designated “most likely to succeed,” then *Pelargonium inquinans* would certainly win the vote. This rather tall plant with felted green leaves is crowned by umbels of lipstick-red blossoms. Used as a headache and cold remedy as well as a body deodorant in its native

South Africa, it reached Britain in 1714 and was cultivated in the garden of Henry Compton, the Bishop of London. Despite its being lanky and slightly ill-kempt, gardeners immediately saw the species' potential as a parent. Bred to the pink-flowering *P. zonale* and rebred again through dozens of successive generations, the offspring blossomed in an incredibly broad range of flower colors. Their petals were more rounded, the umbels held more florets, and the progeny boasted a less cumbersome growth habit than either of their parents. To make a long story short, *P. inquinans* fathered a slew of hybrids that went on to fill window boxes throughout the world. These are the plants we've come to know, love, and refer to erroneously as geraniums. (They are often called “zonal” geraniums in reference to the horseshoe-shaped leaf band that they inherited from their other, lesser-known parent.)

P. inquinans, however, is a rather staid member of a genus known for its gimmicks. *P. lobatum* is much wackier. From the foliage, you'd hardly guess that this is a close relative of our common patio plants. The foliage is almost grapeleaf-shaped with many deeply felted segments and notched edges. The leaves sprout from scaly tubers that plunge into the ground

Like many species pelargoniums, Pelargonium reniforme has sprawling stems that make it a natural for a hanging basket.

but also poke above the soil's surface. In autumn, tall spikes hold a constellation of five-petaled black blossoms edged in yellow. As if that weren't sufficiently entertaining, after dark those macabre black blossoms emit a delightful scent, akin to freshly ground cinnamon.

Another little oddity is *P. gibbosum*, a species famed for woody stems and swollen joints that look uncomfortably reminiscent of arthritic knees and elbows. In fact, it's been nicknamed "the gouty pelargonium." The new growth is tender and pea green with widely spaced celerylike leaves, but within mere months it hardens into stems



TOVAH MARTIN

In the evening, the black flowers of Pelargonium x glaucifolium emit a wonderful fragrance.

that look prematurely aged. The blossoms come throughout the autumn, winter, and early spring. They're a drab, pale yellow, but form highfalutin, many-bristled umbels and give off a faint evening scent. To be sure, *P. gibbosum* isn't the cutest geranium you've ever encountered, but it is definitely a conversation piece.

Pelargonium lobatum is not readily available in this country and *P. gibbosum* is a little ragged for the average windowsill. *P. x glaucifolium*, a hybrid derived from the marriage between these two species, is both more available and more adaptable. To the hybrid's credit, it doesn't follow in *P. gibbosum*'s footsteps. Instead, it takes after *P. lobatum* in both foliage and flower. And come evening, *P. lobatum*'s delightful scent wafts from its black blossoms. Yet thanks to its other parent, *P. x glaucifolium* doesn't skulk along the ground but stands upright on gnarly, woody stems. It really inherited the best of both, but drew one flaw out of the gene pool. In early summer, it goes dramatically dormant, dropping most of its leaves and looking rather pitiful indeed. Mercifully, the slumber period doesn't last long. By the end of summer, *P. x glaucifolium* is again fully clothed.

To appreciate the majesty of *P. gibbosum*, *P. lobatum*, and *P. x glaucifolium*, you really have to possess a taste for the absurd. *P. echinatum*, on the other hand, is a little closer to the mainstream, at least from the flower-stem up. Known as the sweetheart pelargonium, *P. echinatum* has snow-white blossoms with tiny red hearts enhancing the upper two petals. The flowers appear in profusion beginning in late summer and continue until Christmas and sometimes beyond. It really is quite a pretty show. The flowers are held on gray, hard-wooded, prickly stems that aren't particularly good-looking, but they do the job. Without proper pruning, you're apt to see a little too much of those spiny gray appendages. But if you cut *P. echinatum* back occasionally, the handsome, velvety, heart-shaped leaves mask the stems quite nicely.

Not all species pelargoniums must make excuses for their stems. *P. crithmifolium* is grown for both its smooth, succulent tan stems and abundant, pale green, parsleylike foliage. The name alludes to the resemblance of the juicy leaves to the foliage of *Crithmum maritimum*, the herb known as samphire that is often grown in Elizabethan gardens. The contrast between the elephantine stems and the lacy leaves

springing from them is rather comely. The small, slender-petaled white blossoms are usually overlooked.

Not so with *Pelargonium tricolor* (formerly known as *P. violareum* and generally still sold under that name). In this species, both foliage and flowers vie for your attention. The leaves are silvery green, softly felted, deeply notched, and lanceolate with a marked crease down the center. From midsummer until midwinter, copious blossoms smother the leaves. The flowers are as broadly petaled as any of the hybrid zonals and pure white with blush pink stains suffusing the upper petals. In fact, the blossoms look for all the world like those of pansies, and the plant's compact stature compounds the ruse.

There are other species pelargoniums. There is *P. fulgidum*, which has scarlet red blossoms on top of adorable, silver-felted leaves that emit a hideous musky scent when touched. There is *P. reniforme*, with sprawling stems, cute little kidney-shaped leaves, and many umbels of violet-pink flowers that spill from the leaves and look absolutely lovely in a hanging basket. Equally appropriate for draping over the edges of a hanging container is *P. ionidiflorum*, which has tiny, parsleylike leaves on woody stems and an omnipresent supply of thin-petaled blush pink flowers. And there is *P. abrotanifolium*, with foliage that looks so much like the herb southernwood, *Artemisia abrotanum*, that it could easily fool the most astute horticulturist. In fact, there are upwards of 280 species pelargoniums, and I could continue for page after page describing these odd fellows. But you get the picture. Better to devote some space to the secrets of their cultivation.

Since species pelargoniums are so very diverse, it's difficult to lump them within one set of growing instructions. And yet they do share some common ground. In their native South Africa, many of these plants can be found in coastal regions. They thrive in the poor soil of rocky, exposed, wind-swept areas that provide plenty of sun but scant nutrition. So it stands to reason that species pelargoniums prefer a sandy soil such as you might concoct for cacti. They prefer clay pots with very good drainage and they detest over-watering. The roots want to be tightly bound rather than thrashing about in an overly generous container, and they should only be repotted in autumn when new growth is vigorous—never in spring or summer when the dormant period is in the offing.

Above all, species pelargoniums crave sun. They can thrive indoors in a window, but only if that window has an unobstructed southern outlook. In summer, they might go outdoors under the brunt of unfiltered sun, but they must be protected from drenching downpours. Once they have sun, however, species pelargoniums really don't have demanding dispositions. They cheerfully tolerate the low humidity levels typical of the average home. In fact, they prefer a dry atmosphere—a dank, clammy environment will lead to stem rot and fungal infections.

The dormant period can be disquieting if you aren't clued in to the dramatic leaf drop and growth halt that comes in spring and summer. Once you've witnessed this behavior and experienced the reassuring regrowth that begins in autumn, the sequence really becomes quite bearable. Many gardeners find it rather convenient that these house plants slip backstage when the garden outdoors is in full tilt. Of course, not all species pelargoniums plummet into a dramatic slumber. Some merely cease active growth for a short period. But they should all be watered sparingly and fertilizer should be withheld until new growth begins again in late summer or early autumn. Even when growth is vigorous, these plants shouldn't be fed generously. Once every four to six weeks with 20-20-20 or any balanced feed should do it.

Some species pelargoniums can eventually become gangly if they aren't checked by stern pruning. Since the stems so quickly become woody and/or bloated and tough, it's wise to begin pruning early in a pelargonium's career, always dusting the wound with a fungicide afterwards. Fortunately, most species pelargoniums are painfully slow-growing plants, which will prove a blessing for windowsill gardeners trying to hold the line spacewise. This lethargy is also a relief for gardeners who might be squeamish about wielding pruning shears.

Propagating species pelargoniums isn't a fast and easy process. Of all the pelargoniums, cuttings from these plants take the longest to send down roots. Wait until new growth has hardened slightly—young, limp slips rarely take hold as cuttings. Sink the cuttings into sand and wait patiently for a month or two, sprinkling the sand with water only when necessary to keep the cuttings from wilting. Seed is an easier method of increasing the bounty, and these species often set seed. When they do, the

resulting seedheads look like stork's bills. *Pelargos* means "stork" in Greek, and these seedheads run throughout the genus. They are the common ground that links these odd fellows with their more familiar kin. And like the swollen stems and succulent leaves, like the intricate blossoms in offbeat colors, they are strangely beautiful—one more of the many attractions of species pelargoniums.

Tovah Martin is horticulturist at Logee's Greenhouses. Her most recent book is Tasha Tudor's Garden, published by Houghton Mifflin.

SOURCES

Logee's Greenhouses, 141 North Street, Danielson, CT 06239, (203) 774-8038. Catalog \$3.

Richter's, Goodwood, Ontario, L0C 1A0, Canada, (905) 640-6677. Catalog \$2 Canadian, \$1.60 U.S.

Shady Acres Herb Farm, 7815 Highway 212, Chaska, MN 55318, (612) 466-3391. Catalog \$2.

Sunnybrook Farms, 9448 Mayfield Road, P.O. Box 6, Chesterfield, OH 44026, (216) 729-7232. Catalog free.



The flowers of Pelargonium tricolor, often called by its former name, P. violareum, look like those of pansies.

Intrepid Trio

Three orchid species arrived in Hawaii unassisted. Now one of them is in trouble.

B Y J O A N H U S T A C E W A L K E R



MARYL

Conservation of native Hawaiian orchids is one of many projects under the auspices of David Lorence, director of research at the National Tropical Botanical Garden in Kauai.

How many orchid species do you think are at home on the islands of Hawaii? “Must be zillions” is the typical reply. If this was your first guess, don’t feel bad—you’re among the company of noted botanists.

As incredible as it may seem, there are only three orchid species native to the Hawaiian Islands: *Anoectochilus sandvicensis*, a jewel orchid; *Liparis hawaiiensis*, whose common Hawaiian name *awapuhi-a-Kanaloa* translates roughly to “the ginger of Kanaloa”—a Hawaiian deity; and *Platanthera holochila*, a fringed orchid.

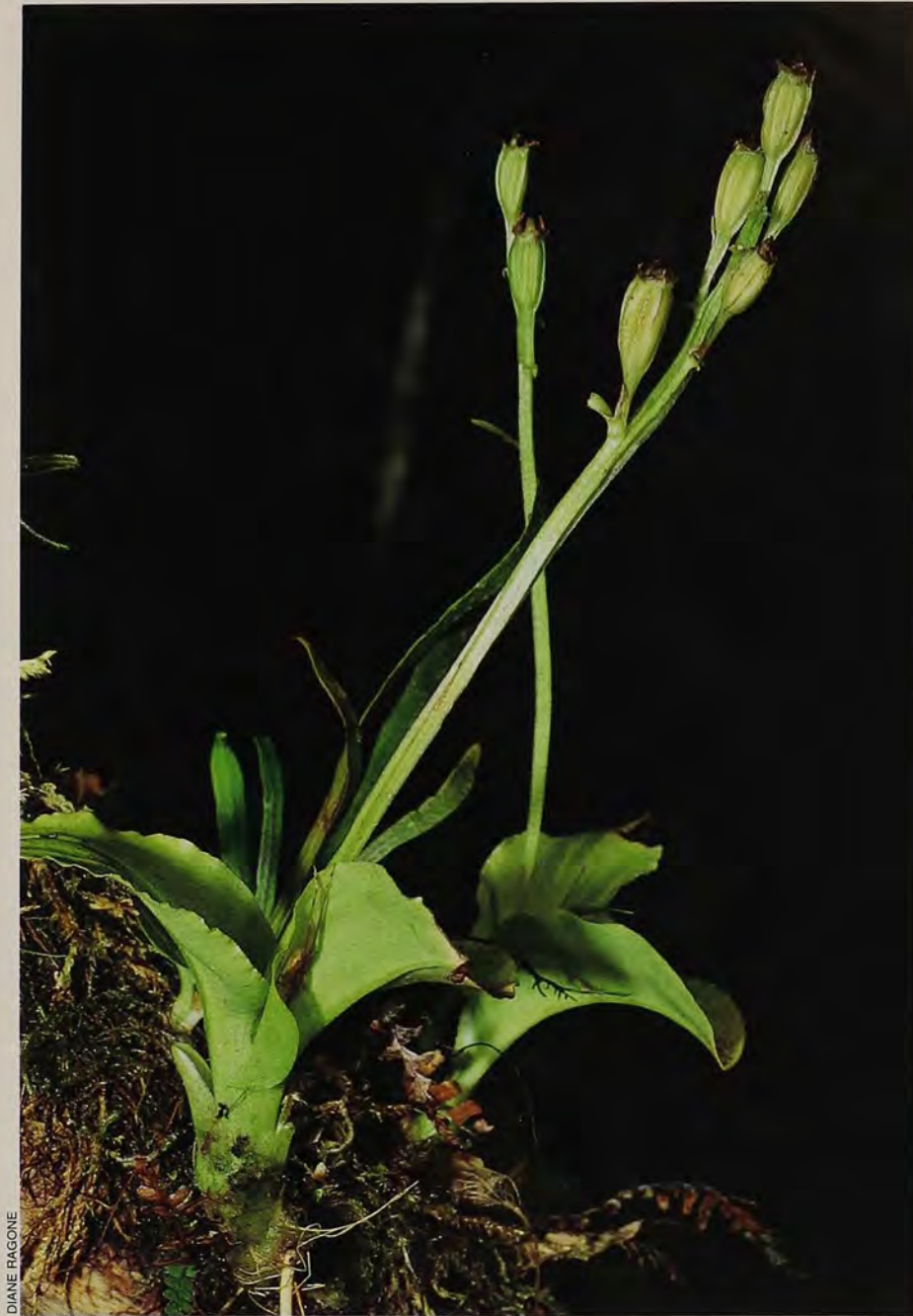
David Lorence, director of research at the National Tropical Botanical Garden (NTBG) in Kauai, Hawaii, says it’s actually not all that surprising that Hawaii is home to only three orchid species. Some authorities have suggested that orchid seeds, which are among the smallest of any flowering plant, could have hitched a ride to Hawaii millions of years ago on migratory birds. But Lorence maintains that before humans arrived on the islands, the most likely way for such plants to naturalize was for the nearly microscopic seeds to have been carried to the isolated archipelago by the jet stream.

Once seeds actually made it to Hawaii, other challenges to successful colonization awaited. “If it had a short seed life,” says Lorence, “the seed would not be viable by

the time it arrived at the islands. Also, orchids require a mycorrhizal fungus to germinate.” Lacking the food store carried by larger seeds, the embryonic orchid relies on sharing the nutrients that are assimilated from organic matter by soil fungi that “infect” the orchid by means of tiny threads called hyphae. The arrangement is usually mutually beneficial, but occasionally the fungus overwhelms and consumes a weak orchid, and vice versa.

Even if the orchid seed did manage to link up with the appropriate fungus, there was a good chance it could never reproduce. “Orchids many times have very specific mechanisms for pollination,” explains Lorence. “There may have been a lack of suitable pollinators.” Since it was between five million and 10 million years ago that the westernmost and oldest island of the volcanic Hawaiian chain emerged from the Pacific Ocean, successful natural migration of orchids averaged less than one in a million years.

Despite their tenacity, the native orchid species are not very showy. The orchids commonly seen hanging from trees or cascading in a profusion of color alongside walkways in local parks are not indigenous. “These are orchid species that were originally brought to Hawaii for the purpose of cultivation,” says Lorence, “and they naturalized.” The four most common naturalized species are *Arundina graminifolia*



DIANE RAGONE



STEVE PERLMAN

Of the orchids native to Hawaii, *Liparis hawaiiensis*, left, is the most common, its inflorescence rising from two leaves at the base of the stem. *Platanthera holochila*, above, on the other hand, is quite rare and is a candidate for listing as an endangered species.

folia, the bamboo orchid; *Phaius tankervilleae*, Chinese ground or nun's orchid; *Epidendrum* × *obrienianum*, a hybrid commonly called scarlet or butterfly orchid; and *Spathoglottis plicata*, the Malayan ground orchid, which has a history of colonization—*S. plicata* was among three orchids found on what little was left of the denuded Indonesian island of Krakatau 13 years after its eruption in 1883. The orchid was likely spread by wind from nearby Java. With the exception of *Epidendrum*, which is epiphytic (its Latin name means “upon a tree”), the major imported orchids are terrestrials that were introduced to the islands between the 1920s and the 1940s.

Orchid species fall into two broad

groupings based on whether they usually grow on trees or on the ground. Epiphytic orchids, which comprise the majority of orchid species and are most common in the tropics, typically grow in the upper canopy attached to tree limbs. Terrestrial orchids are found predominantly in temperate regions, where they grow in meadows, open forests, and along stream banks. Whereas epiphytes are usually equipped with a fleshy water-storage organ called a pseudobulb that helps them withstand dry periods, most terrestrials require a steady supply of moisture to survive. Except for a few bog-dwelling species, terrestrials also require well-drained, open soil, which means that the ground must be “fluffy” with humus or

layered with dead and rotting vegetation. Because they are easier to grow than their terrestrial counterparts, epiphytes account for the vast majority of orchids sold commercially. Terrestrial orchids are still not completely understood and are extremely challenging.

Even orchid specialists can be stumped by terrestrials. The terrestrial native orchids of Hawaii have proven difficult to propagate. "We attempted to grow two of the [endemic] species here at the arboretum," says Charles Lamoureux, director of the University of Hawaii's Harold L. Lyon Arboretum in Honolulu, "but we weren't very successful." In addition to other problems, it appears the orchids were negatively affected by the lower altitude in Honolulu.

Of the indigenous species, the most common is *Liparis hawaiiensis*, which comes from a fairly cosmopolitan genus of more than 200 species. Its name is derived from the Greek *liparos*, which means oily or smooth, and refers to the glossy surface of the species' two bright-green leaves. *L. hawaiiensis* is unlikely to be cultivated for its blooms, but is abundant and easily viewed. Its small pale-green flowers are held erect on terminal inflorescences during its flowering period from May through July. Though primarily terrestrial, *L. hawaiiensis* has been found growing on moss-covered trees. More commonly, it can be found growing under bushes, on bare wet ground, in seasonally wet ground in mesic forests, and in bogs. Its altitude range is from 1,300 to 6,600 feet.

Anoectochilus sandvicensis is a member of the "jewel orchids," known for their multicolored foliage. A better-known member of this group is the beautifully foliaged terrarium-grower, *Ludisia discolor*. The Hawaiian species does not have the brilliant foliage of *L. discolor*; its leaves are dark green on the upper surface and paler green below, and its two- to six-inch spike of pale yellow-green flowers appears between August and November. According to John Obata, a retired school teacher and longtime orchid fancier who is one of the few people to have seen all three native species, the blooms of *Anoectochilus sandvicensis* "are the prettiest of the three species." *A. sandvicensis* can be spotted growing in dense shade on wet ground or on the lower parts of tree trunks. On rare occasions it has been spotted growing epiphytically on tree ferns in wet forests. Its preferred altitude range is from 900 to 5,600 feet.

Unfortunately, the largest and most recognizable of the Hawaiian orchid species, *Platanthera holochila*, is in danger of extinction and is a candidate for immediate listing as threatened or endangered under the federal Endangered Species Act. Joel Lau, a botanist working for the Nature Conservancy on the Hawaiian National Heritage Program, says that only five sightings of *P. holochila* have been made within the last decade, although about a year ago a new population of about a dozen plants was found on the Nature Conservancy's Kapunakea Preserve on Maui. Lau says the known population of *P. holochila* is now between 25 and 30 plants. Under the auspices of the U.S. Fish and Wildlife Service, Lau and other staff at the Nature Conservancy are collecting data on *P. holochila* to be used in preparing a draft proposal for listing the species as endangered.

The cause of its demise is not certain. Lorence suggests it may be a combination of factors, including the loss or destruction of lower elevation habitats by the creation of cattle pastures, collection prior to its endangered status, rooting by feral pigs, low seed viability or poor germination, and competition from invasive imported plants. "Most native plants evolved away from competition and are not very vigorous," explains Lorence.

P. holochila is only found at high altitudes in remote areas on the islands of Kauai, Maui, and Molokai. It has not yet been seen on "the big island" of Hawaii, the easternmost and youngest island in the chain. When blooming, its tall spike covered by greenish yellow flowers makes it easy to spot. Of the three native species, it has the longest blooming season, beginning in June and continuing through September. *P. holochila* is truly terrestrial, with stems rising from subterranean tubers and pale green leaves that are simple and alternate.

According to Obata, *P. holochila* never was very common. "It has not been spotted on Oahu since the early '40s," he says. Obata spent 40 years trying to view this rare orchid. With the help of a guide, he finally found it in the boggy inner recesses of Kauai's Alakai Swamp. This was no casual field trip. "It was back a few years before there was a boardwalk," he relates. "Once we got through the forested area, we had a nearly vertical, moss-covered climb . . . pulling ourselves up from branch to branch. After this we had to cross a thigh-deep stream and another bog." For



STEVE PERLMAN

The glossy yellow blossoms of *Anoectochilus sandvicensis*, one of the "jewel orchids," are considered the showiest among Hawaii's endemic orchid species.



Obata it was all made worthwhile by the rare sight of a *P. holochila* population. But today, even with the boardwalk, he warns prospective explorers: "If you don't know the way, you may never come out." The Alakai Swamp has claimed the lives of more than one inexperienced hiker.

Efforts to propagate *P. holochila* have been frustrating at best. Greg Koob, graduate assistant for Lyon Arboretum, has "rescued" an impressive number of endangered native Hawaiian plant species, but *P. holochila* has so far defied all his efforts.

Using the delicate laboratory methods necessary to germinate and grow all orchid seeds, Koob was able to germinate seeds received from the NTBG and get them to the protocorm stage, where the testa, or seed coat, splits, and the embryo normally turns green and develops fine hairs on its underside. "But they never got past that stage. They lived for about four or five months, stayed white, never turned green, didn't get any roots or shoots," he laments.

When Koob realized *Platanthera* was being stubborn, he tried different tactics in hopes of activating the plants to the next stage. "I tried different media studies, light

and dark regimes, and cold and warm regimes," he relates. "Nothing could get them past that protocorm stage."

Koob believes that *P. holochila* "may need the association with a mycorrhizal fungus to reach the next stage." He is ready to test his theory in the laboratory using a fungus commonly found in soil around the plant in the wild. He may also test a nonspecific mycorrhizal fungus that is known to be symbiotic with several orchid species. "The trick will be keeping the fungus from outgrowing and killing the orchid, since the fungus grows well in the medium and doesn't need the orchid to survive." Koob adds, "There's a fine line I'll have to walk to make this work."

Researchers hope *P. holochila* will hold out long enough to be saved, but Lorence is concerned this may not be the case. "The one clump that was used last year to obtain the seed pods is not increasing its population," he says. As with other endangered species, only time will tell . . . and the race is on.

Joan Hustace Walker is a free-lance writer who lives in Mechanicsburg, Pennsylvania.

These pressed specimens of Liparis hawaiiensis, left, collected in 1933, now reside in the Herbarium Pacificum of the Bernice P. Bishop Museum in Kauai. Above, Greg Koob, a graduate assistant at the Harold L. Lyon Arboretum in Honolulu, is attempting to propagate Platanthera holochila in the laboratory.

PRONUNCIATIONS

Abies alba AY-beez AL-buh
A. balsamea A. ball-SAM-ee-uh
A. douglasii A. dug-LASS-ee-eye
A. fraseri A. FRAYZ-yer-eye
Abronia fragrans uh-BROH-nee-uh
 FRAY-granz
Acer spp. AY-ser
Agastache anethiodora ah-guh-STAH-she
 an-uh-thee-oh-DOR-uh
A. barberi A. BAR-ber-eye
A. foeniculum A. fee-NICK-yew-lum
Allium cernuum AL-ee-um SER-new-um
A. tuberosum A. too-bur-OH-sum
Amelanchier sp. am-eh-LANG-kyer
Amsonia tabernaemontana am-SO-nee-uh
 tuh-bur-nay-mon-TAN-uh
Anoectochilus sandvicensis an-oke-toh-CHIL-
 us sand-vih-CHEN-sis
Aquilegia caerulea ah-kwi-LEE-juh
 seh-ROO-lee-uh
A. canadensis A. kan-uh-DEN-siss
A. chrysantha A. kris-AN-thuh
A. longissima A. lon-JIH-sih-muh
Artemisia abrotanum ar-teh-MEEZ-yuh uh-
 BROH-tan-um
Arundina graminifolia ah-run-DEE-nuh
 grah-mih-nih-FOE-lee-uh
Aster azureus ASS-ter as-ZYUR-ee-us
A. bigelovii bih-guh-LOW-vee-eye
A. novae-angliae A. NO-vye-ANG-lee-eye
Baptisia australis bap-TIZ-yuh aw-STRAY-
 liss
Betula papyrifera BET-yew-luh pap-ih-RIH-
 fer-uh
Bidens spp. BY-denz
Boltonia asteroides bohl-TOH-nee-uh ass-
 tuh-ROY-deez
Borago officinalis bohr-RAY-goh oh-fiss-ih-
 NAL-iss
Callirhoe involucrata kah-LIR-oh-ee in-vol-
 yew-KRAY-tuh
Campanula rotundifolia kam-pan-YEW-luh
 roe-tund-ih-FOE-lee-uh
Caragana kair-uh-GAN-uh
Cassia marilandica KASS-ee-uh
 mair-ih-LAN-dih-kuh
Centaurea cyanus sen-TAW-ree-uh
 SIGH-an-us
Cercis canadensis SER-siss kan-uh-
 DEN-siss
Chilopsis linearis ky-LOP-siss lih-
 nee-YAR-iss
Clematis vitalba KLEM-uh-tiss vy-TAL-buh
Clethra alnifolia KLETH-ruh al-nih-FOE-
 lee-uh
Coreopsis verticillata koh-ree-OP-sis ver-tih-
 sih-LAY-tuh

Cornus canadensis KOR-nus kan-uh-
 DEN-siss
Crithmum maritimum KRITH-mum muh-
 WRIT-ih-mum
Crocus spp. CROW-kus
Datura meteloides duh-TOO-ruh meh-teh-
 LOY-deez
Dennstaedtia punctilobula den-STET-ee-uh
 punk-tih-LOW-bew-luh
Dicentra eximia dy-SEN-truh eks-ZIM-ee-uh
D. formosa D. for-MOH-suh
D. spectabilis D. spek-TAB-ih-luss
Dipsacus sylvestris DIP-suh-kus sil-VES-triss
Echinacea purpurea ek-ih-NAY-see-uh per-
 PER-ee-uh
Echinochereus fendleri var. *kuenzleri* eh-kee-
 no-SEER-ee-us fend-LER-eye var. koonz-
 LER-eye
E. hempelii E. hem-PEL-ee-eye
Epidendrum × *obrienianum* eh-pih-DEN-
 drum × oh-bree-en-ee-AH-num
Epilobium angustifolium eh-pih-LOW-bee-
 um ang-gus-tih-FOE-lee-um
Erica carnea eh-RY-kuh KAR-nee-uh
Erythronium americanum air-ih-THROW-
 nee-um uh-mer-ih-KAN-um
Eschscholzia californica es-SHOLTZ-zee-uh
 kal-ih-FORN-ih-kuh
Evodia danielli ee-VOH-dee-uh dan-YEL-eye
Ficus lyrata FIE-kus ly-RAY-tuh
Gaillardia × *grandiflora* gay-LARD-ee-uh ×
 gran-dih-FLOR-uh
G. pulchella G. pul-KEL-uh
Galanthus nivalis guh-LAN-thus nih-VAL-iss
Gaultheria shallon gahl-THEER-ee-uh
 SHAL-lon
Geranium robertianum juh-RAY-nee-um raw-
 bur-tee-AN-um
Gleditsia triacanthos gleh-DIT-see-uh try-uh-
 CAN-thos
Helianthus maximiliani hee-lee-AN-thus
 maks-ih-mil-ee-AN-eye
H. scabra H. SKAY-bruh
Hamamelis ham-uh-ME-liss
Helenium autumnale heh-LEE-nee-
 um aw-tum-NAY-lee
H. hoopesii H. who-PEZ-ee-eye
Heliopsis helianthoides hee-lee-OP-
 siss hee-lee-an-THOY-deez
Ilex spp. EYE-leks
Ipomoea spp. ih-poh-ME-uh
Koelereteria paniculata kel-roo-
 TEE-ree-uh pan-ik-yew-LAY-tuh
Larix laricina LAY-riks lah-rih-SIGH-nuh
Lavandula spp. lah-VAN-dyew-luh
Lespedeza spp. les-peh-DEE-zuh
Lindera benzoin lin-DAIR-uh BEN-zoh-in

Liparis hawaiiensis LY-pah-riss huh-wy-ee-
 EN-siss
Liriodendron tulipifera leer-ee-oh-DEN-dron
 too-lih-PIH-fer-uh
Ludisia discolor loo-DIZ-yuh DIS-kuh-ler
Lupinus perennis loo-PIE-nus per-EN-is
Magnolia spp. mag-NOLE-yuh
Mahonia aquifolium mah-HO-nee-uh ah-
 kwi-FOE-lee-um
Malus spp. MAL-us
Malva spp. MAL-vuh
Matteuccia mah-TOO-key-uh
Mentha spp. MEN-tha
Mirabilis longiflora mih-RAB-ih-liss lon-jih-
 FLOR-uh
Miscanthus miz-KAN-thus
Monarda didyma moh-NAR-duh
 DID-ih-muh
M. punctata M. punk-TAY-tuh
Myosotis spp. my-oh-SEW-tis
Nicotiana glauca nih-ko-shee-AN-uh
 ah-LAY-tuh
Opuntia oh-PUN-shuh
Origanum spp. oh-RYG-uh-num
Oxydendrum arboreum ok-sih-DEN-drum
 ar-BO-ree-um
Parthenocissus quinquefolia par-then-oh-
 SISS-us kwin-kweh-FOE-lee-uh
Pelargonium abrotanifolium peh-lar-GOH-
 nee-um ab-row-tan-ih-FOE-lee-um
P. crithmifolium P. krith-mih-FOE-lee-um
P. echinatum P. eh-kee-NAY-tum
P. fulgidum P. FUL-jih-dum
P. gibbosum P. jih-BOH-sum
P. × glaucifolium P. × glaw-sih-FOE-lee-um
P. inquinans P. IN-qwi-nans
P. ionidiflorum P. eye-oh-nid-ih-FLOR-um
P. lobatum P. low-BAY-tum
P. reniforme P. REN-ee-form
P. tricolor P. TRY-kul-er
P. zonale P. zoh-NOWL
Penstemon barbatus PEN-steh-mon
 bar-BAY-tus
P. barrettiae P. buh-RET-ee-eye
P. bridgesii P. brid-JEZ-ee-eye
P. campanulatus P. kam-pan-yew-LAY-tus
P. cardinalis P. kar-dih-NAL-iss
P. confertus P. kon-FER-tus
P. eatonii P. ee-TONE-ee-eye
P. floridus P. FLOR-ih-dus
P. gentianoides P. jen-shen-OY-deez
P. glaber P. GLAY-ber
P. kunthii P. koon-TEE-eye
P. linarioides P. lin-air-ee-OY-deez
P. neomexicanus P. nee-oh-mex-ih-KAN-us
P. ovatus P. oh-VAY-tus
P. pinifolius P. py-nih-FOE-lee-us



P. rostriflorus P. rah-stih-FLOR-us
P. rydbergii P. rid-BERG-ee-eye
P. pseudospectabilis P. soo-doe-spek-tuh-BIL-iss
P. strictus P. STRIK-tus
P. tenuis P. TEN-yew-iss
P. venustus P. veh-NUS-tus
P. whippleanus P. whi-puh-LAY-nus
Petalostemum foliosum peh-tal-oh-STEE-mum pho-lee-OH-sum
Phaius tankervilleae FAY-us tang-ker-VIL-lee-eye
Phlox drummondii FLOKS drum-MON-dee-eye
Physostegia spp. fie-so-STEE-juh
Picea glauca PIE-see-uh GLAW-kuh
P. mariana P. mahr-ee-AN-uh
P. rubens P. ROO-benz
Pinus banksiana PIE-nus bank-see-AN-uh
P. strobus P. STROH-bus
P. sylvestris P. sil-VES-triss
Platanthera holochila pluh-TAN-ther-uh hoh-lo-CHIH-luh
Polemonium reptans pahl-eh-MO-nee-um REP-tanz
Prunus spp. PREW-nus
Pycnanthemum pilosum pik-NAN-thuh-mum pih-LOW-sum
Ratibida columnifera rah-TIH-bi-dah kol-um-NIH-fer-uh
Robinia pseudoacacia row-BIN-ee-uh soo-doe-uh-KAY-shuh
Rosmarinus officinalis roze-muh-RY-nus oh-fiss-ih-NAL-iss
Rudbeckia spp. rood-BEK-ee-uh FUL-jih-duh
Salix spp. SAY-lik
Salvia azurea SAL-vee-uh as-YEW-ree-uh
S. farinacea S. fahr-ih-NAY-see-uh
Sidalcea malviflora sid-AL-see-uh mal-vih-FLOR-uh
Silene laciniata SY-lean luh-syn-ee-AY-tuh
Sisyrinchium angustifolium siss-ih-RING-kee-um ang-gus-tih-FOE-lee-um
Solidago spp. sol-ih-DAY-go
× Solidaster luteus sol-ih-DASS-ter LOO-tee-us
Spathoglottis plicata spath-o-GLOT-iss ply-KAY-tuh
Symphoricarpos spp. sym-foh-rih-KAR-poz
Syringa meyeri sih-REENG-guh MY-yer-eye
S. reticulata S. reh-tik-yew-LAY-tuh
Tagetes erecta tah-JEE-teez eh-REK-tuh
Tanacetum niveum tan-uh-SEE-tum nih-VEE-um
Taxus × media TAK-suss MEE-dee-uh
Thermopsis caroliniana thur-MOP-siss kair-oh-lin-ee-AN-uh
T. montana T. mon-TAN-uh
Thymus serpyllum TY-muss sur-PILL-um
Tilia americana TIH-lee-uh uh-mer-ih-KAN-uh
Tropaeolum majus troh-PEE-oh-lum MAY-juss
Verbena hastata ver-BEE-nuh hoss-TAY-tuh
Veronicastrum virginicum ver-on-ih-KASS-trum vir-JIN-ih-kum
Victoria amazonica vic-TOH-ree-uh am-ah-ZAHN-ih-kuh
Viola canadensis VY-oh-luh kan-uh-DEN-siss
V. pubescens V. pyew-BESS-enz
Zauschneria arizonica zowsh-NEH-ree-uh air-ih-ZOWN-ih-kuh
Zinnia elegans ZIN-ee-uh EL-ih-ganz



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1994 INDEX

AUTHOR

Barad, Gerald S., Review: *The Complete Book of Cacti and Succulents*, Feb., 44.
 Beikmann, Stan, Review: *Ferns for American Gardens*, Oct., 16.
 Bir, Richard E., "Woodies From the Wetlands," Apr., 15.
 Branson, Branley Allan, "The Loud-mouth of the Woods," Aug., 10.
 Bright, Chris, "The Divine Witch Hazel," Apr., 8. "Flora of the Big Apple," Apr., 12. "Through a Glass Darkly," Feb., 10. "Virginia Creeper," Feb., 8. "Wild Roses," June, 10.
 Bright, Martha, "Tippy of the Jungle," Oct., 11.
 Cappiello, Paul E., Review: *Gardening with Groundcovers and Vines*, Feb., 42.
 Cullen, Kathleen, "Hydrangeas—So Passé, So Today," June, 25.
 Cunningham, Isabel Shipley, Review: *Seeds of Change: The Living Treasure*, June, 16.
 Dean, Molly, "Golden Boughs," Oct., 25.
 Devine, Richard, "Attracting Hummers," Aug., 24. "Avian Gardener," Aug., 18.
 Dominick, Anne Westbrook, "What's the Buzz?," Dec., 29.
 Druse, Ken, "Desert Diversity," Apr., 38.
 Dubé, Richard L., "Natural Inspirations," Dec., 23.
 Eddison, Sydney, "The Man Who Moves Mountain Laurels," June, 18.
 Ellis, David J., "Fragrance of Fir," Dec., 10. "Hues to Blame," Oct., 27. "Mesic Counterparts," Oct., 9.
 Fisher, Kathleen, Reviews: *Crazy About Gardening*, Aug., 17; *The Natural Habitat Garden*, June, 17; *The Water Gardener*, Apr., 42. "Bred in the USA," Oct., 39. "Doing the Bat Stroke?," Aug., 20. "Starting Trees Right," June, 13.
 Foster, Steven, Review: *Tales of a Shaman's Apprentice*, Feb., 41.
 Fuchs, Lucy, "Plant Sales," Feb., 5.
 Geneve, Robert, "Of Twiners, Tendrils,

Hooks, and Blebs," June, 30.
 Guest, Margery, "A Great Notion in Grand Rapids," Aug., 27. "Up North, In Search of a Whirligig," Aug., 6.
 Halpin, Anne, Review: *Creating a Garden for the Senses*, Aug., 15.
 Harper, Pamela, Review: *The Undaunted Garden*, Dec., 13.
 Henning, Jack, "After July—*Agastache*," Aug., 32.
 Hicks, June L., Review: *Green Byways*, Apr., 41.
 Hinkley, Daniel, "Refreshing Gaultherias," Aug., 39.
 Iversen, Richard R., "Rustic Pleasures," Oct., 30.
 Johnson, Larry, "Garden Videos," Dec., 12.
 Keyser, Joseph M., Reviews: *The Lawn: A History of an American Obsession*, Aug., 15. *Pests of Landscape Trees and Shrubs: An Integrated Pest Management Guide*, Dec., 14.
 Knight, Alice, Proven Performers: "Heathers," Feb., 15.
 Kruse, Julie, "Minnesota Celebrates Its Children," Aug., 12.



MICHAEL S. THOMPSON

'Winter Red' winterberry holly, April

La Pierre, Yvette, "Poached Parklands," Oct., 19.
 Langford, Norma Jane, "The Groves of Academe," Feb., 36. "Life in Hull," Apr., 20.
 Laski, Karen M., "Heirlooms of a Revolutionary," Apr., 33.
 Lee, Rand B., and Nancy McDonald, "All-American Cottage Gardens," Dec., 16.
 Lindauer, Ethel Evans, "The Quiet Garden," Feb., 32.
 Locklear, James H., "On Fire for Phlox," June, 38.
 Loewer, Peter, Proven Performers: "Dwarf Conifers," Feb., 25. "The Moss Garden," Aug., 13.
 Lovejoy, Sharon, "Carrot Capers," Apr., 13.
 Martin, Tovah, "Knotty But Nice," Dec., 34.
 McDonald, Nancy, and Rand B. Lee, "All-American Cottage Gardens," Dec., 16.
 Miller, Candace, "Storytelling," Feb., 12.
 Nold, Robert, "Penstemon Heaven," Oct., 35.
 Ode, Arthur H., Jr., "Eureka!," Oct., 41. "One Jump Ahead," Oct., 6. "What Goes Around," Apr., 5.
 Perry, Maggie, "Mantis Metamorphosis," Aug., 37.
 Stein, Sara, "Tracking the Natives," Apr., 26.
 Taylor, Patricia A., "Patently Superior," Feb., 29.
 Tig, Glen, "Prayers for Tomatoes," Dec., 6.
 Trager, James, Review: *Complete Garden Guide to the Native Shrubs of California*, June, 17.
 Trout, Darrell, Proven Performers: "Gesneriads," Feb., 20.
 Tucker, Arthur O., Review: *Life Processes of Plants*, Apr., 41.
 Turner, H. Kibbe, "Indelible Impressions," June, 15.
 Tynan, Chip, Review: *Water-wise Gardening: America's Backyard Revolution*, Oct., 17.

Walker, Joan Hustace, "Intrepid Trio," Dec., 38.
 Waterman, Martin, "Play It Again, Sambucus," June, 35.
 Way, Roger D., Review: *The Book of Apples*, Oct., 16.
 White, James J., Review: *The Art of Botanical Illustration*, Dec., 13.
 Wiesner, Mary Beth, "Gentian Pinkroot," Apr., 10. "Kuenzler Hedgehog Cactus," Dec., 9. "Northern Wild Monkshood," Feb., 9. "Sebastopol Meadow Foam," Oct., 13. "Texas Trailing Phlox," June, 11. "Virginia Spirea," Aug., 9.
 Williamson, Nikole, "A Rose in Harlem," Oct., 14.
 Yee, Mary, "Remembrance of Flowers Past," June, 5.

TITLE

After July—*Agastache*, Aug., 32.
 All-American Cottage Gardens, Dec., 16.
 Attracting Hummers, Aug., 24.
 Avian Gardener, Aug., 18.
 Bred in the USA, Oct., 39.
 Carrot Capers, Apr., 13.
 Desert Diversity, Apr., 38.
 Divine Witch Hazel, The, Apr., 8.
 Doing the Bat Stroke?, Aug., 20.
 Dwarf Conifers, Feb., 25.
 Eureka!, Oct., 41.
 Flora of the Big Apple, Apr., 12.
 Fragrance of Fir, Dec., 10.
 Garden Videos, Dec., 12.
 Gentian Pinkroot, Apr., 10.
 Gesneriads, Feb., 20.
 Golden Boughs, Oct., 25.
 Great Notion in Grand Rapids, A, Aug., 27.
 Groves of Academe, The, Feb., 36.
 Heathers, Feb., 15.
 Heirlooms of a Revolutionary, Apr., 33.
 Hues to Blame, Oct., 27.
 Hydrangeas—So Passé, So Today, June, 25.
 Indelible Impressions, June, 15.
 Intrepid Trio, Dec., 38.
 Knotty But Nice, Dec., 34.
 Kuenzler Hedgehog Cactus, Dec., 9.
 Life in Hull, Apr., 20.
 Loudmouth of the Woods, The, Aug., 10.
 Man Who Moves Mountain Laurels, The, June, 18.
 Mantis Metamorphosis, Aug., 37.
 Mesic Counterparts, Oct., 9.
 Minnesota Celebrates Its Children, Aug., 12.
 Moss Garden, The, Aug., 13.
 Natural Inspirations, Dec., 23.

Northern Wild Monkshood, Feb., 9.
 Of Twiners, Tendrils, Hooks, and Blebs, June, 30.
 On Fire for Phlox, June, 38.
 One Jump Ahead, Oct., 6.
 Patently Superior, Feb., 29.
 Penstemon Heaven, Oct., 35.
 Plant Sales, Feb., 5.
 Play It Again, Sambucus, June, 35.
 Poached Parklands, Oct., 19.
 Prayers for Tomatoes, Dec., 6.
 Quiet Garden, The, Feb., 32.
 Refreshing Gaultherias, Aug., 39.
 Remembrance of Flowers Past, June, 5.
 Rose in Harlem, A, Oct., 14.
 Rustic Pleasures, Oct., 30.
 Sebastopol Meadow Foam, Oct., 13.
 Starting Trees Right, June, 13.
 Storytelling, Feb., 12.
 Texas Trailing Phlox, June, 11.
 Through a Glass Darkly, Feb., 10.
 Tippy of the Jungle, Oct., 11.
 Tracking the Natives, Apr., 26.
 Up North, In Search of a Whirligig, Aug., 6.
 Virginia Creeper, Feb., 8.
 Virginia Spirea, Aug., 9.
 What Goes Around, Apr., 5.
 What's the Buzz?, Dec., 29.
 Wild Roses, June, 10.
 Woodies From the Wetlands, Apr., 15.

SUBJECT

Agastache: "After July—*Agastache*," Aug., 32.
 Arkansas—Public Gardens: "Eureka!," Oct., 41.
 Bats: "Doing the Bat Stroke?," Aug., 20.
 Birds: "Attracting Hummers," Aug., 24. "Avian Gardener," Aug., 18.
 Book Reviews: *The Art of Botanical Illustration*, Dec., 13. *The Book of Apples*, Oct., 16. *The Complete Book of Cacti and Succulents*, Feb., 44. *Complete Garden Guide to the Native Shrubs of California*, June, 17. *Crazy About Gardening*, Aug., 17. *Creating a Garden for the Senses*, Aug., 15. *Ferns for American Gardens*, Oct., 16. *Gardening with Groundcovers and Vines*, Feb., 42. *Green Byways*, Apr., 41. *The Lawn: A History of an American Obsession*, Aug., 15. *Life Processes of Plants*, Apr., 41. *The Natural Habitat Garden*, June, 17. *Pests of Landscape Trees and Shrubs: An Integrated Pest Management Guide*, Dec., 14. *Seeds of Change: The Living Treasure*, June, 16. *Tales of a Shaman's Apprentice*, Feb., 41. *The Undaunted Garden*, Dec., 13. *The*



KATHLEEN CULLEN

Lacecap hydrangeas, June.

Water Gardener, Apr., 42. *Water-wise Gardening: America's Backyard Revolution*, Oct., 17.
 Borre, Betsy: "A Great Notion in Grand Rapids," Aug., 27.
 Breeders: "Patently Superior," Feb., 29.
 Cats: "Tippy of the Jungle," Oct., 11.
 Children and Gardening: "Carrot Capers," Apr., 13. "Garden Videos," Dec., 12. "Indelible Impressions," June, 15. "Minnesota Celebrates Its Children," Aug., 12. "A Rose in Harlem," Oct., 14. "Storytelling," Feb., 12.
 Conifers, Dwarf: "Dwarf Conifers," Feb., 25.
 Cottage Gardens: "All-American Cottage Gardens," Dec., 16.
 Desert Gardening: "Desert Diversity," Apr., 38. "Penstemon Heaven," Oct., 35.
 Emotional Impact of Plants: "The Quiet Garden," Feb., 32.
 Endangered Plants: "Gentian Pinkroot," Apr., 10. "Kuenzler Hedgehog Cactus," Dec., 9. "Northern Wild Monkshood," Feb., 9. "Poached Parklands," Oct., 19. "Sebastopol Meadow Foam," Oct., 13. "Texas Trailing Phlox," June, 11. "Virginia Spirea," Aug., 9.
 Eureka Springs, Arkansas: "Eureka!," Oct., 41.
 Evolution of Plants: "Of Twiners, Tendrils, Hooks, and Blebs," June, 30.
 Fall Foliage: "Golden Boughs," Oct., 25. "Hues to Blame," Oct., 27.
 Flemer, William, III: "Patently Superior," Feb., 29.
 Fruit: "Play It Again, Sambucus,"

June, 35.

Garden Furniture: "Rustic Pleasures," Oct., 30.

Gardening Challenges: "Life in Hull," Apr., 20.

Gaultherias: "Refreshing Gaultherias," Aug., 39.

Gentian Pinkroot: "Gentian Pinkroot," Apr., 10.

Gesneriads: "Gesneriads," Feb., 20.

Heathers: "Heathers," Feb., 15.

Heirloom Plants: "Heirlooms of a Revolutionary," Apr., 33.

Historic Plants: "Heirlooms of a Revolutionary," Apr., 33.

House Plants: "Knotty But Nice," Dec., 34. "Through a Glass Darkly," Feb., 10.

Hydrangeas: "Hydrangeas—So Passé, So Today," June, 25.

Insects: "The Loudmouth of the Woods," Aug., 10. "Mantis Metamorphosis," Aug., 37. "What's the Buzz?," Dec., 29.

Jaynes, Richard: "The Man Who Moves Mountain Laurels," June, 18.

Jefferson, Thomas: "Heirlooms of a Revolutionary," Apr., 33.

Kalmia: "The Man Who Moves Mountain Laurels," June, 18.

Landscape Features: "Rustic Pleasures," Oct., 30.

Landscaping: "The Groves of Academe," Feb., 36. "Natural Inspirations," Dec., 23.

Laurels, Mountain: "The Man Who Moves Mountain Laurels," June, 18.

Low-water Plants: "Desert Diversity," Apr., 38. "Penstemon Heaven," Oct., 35.

Massachusetts—Private Gardens: "Life in Hull," Apr., 20.

Meadow Foam: "Sebastopol Meadow Foam," Oct., 13.

Meijer, Frederik: "A Great Notion in Grand Rapids," Aug., 27.

Michigan—Public Gardens: "A Great Notion in Grand Rapids," Aug., 27.

Minnesota—Public Gardens: "Minnesota Celebrates Its Children," Aug., 12.

Monkshood: "Northern Wild Monkshood," Feb., 9.

Moss: "The Moss Garden," Aug., 13.

Natives: "All-American Cottage Gardens," Dec., 16. "Avian Gardener," Aug., 18. "Desert Diversity," Apr., 38. "The Divine Witch Hazel," Apr., 8. "Fragrance of Fir," Dec., 10. "The Man Who Moves Mountain Laurels," June, 18. "Mesic Counterparts," Oct., 9. "On Fire for Phlox," June, 38. "Penstemon Heaven," Oct., 35. "Poached Parklands," Oct., 19. "Refreshing Gaultherias," Aug., 39. "Tracking the Natives," Apr., 26. "Virginia Creeper," Feb., 8. "What's the Buzz?," Dec., 29. "Wild Roses," June, 10. "Woodies From the Wetlands," Apr., 15.

New York City: "Flora of the Big Apple," Apr., 12. "A Rose in Harlem," Oct., 14.

Offshoots: "One Jump Ahead," Oct., 6. "Plant Sales," Feb., 5. "Prayers for Tomatoes," Dec., 6. "Remembrance of Flowers Past," June, 5. "Up North, In Search of a Whirligig," Aug., 6. "What Goes Around," Apr., 5.

Orchids: "Intrepid Trio," Dec., 38.

Parks, National: "Poached Parklands," Oct., 19.

Pelargoniums: "Knotty But Nice," Dec., 34.

Penstemons: "Bred in the USA," Oct., 39. "Penstemon Heaven," Oct., 35.

Phlox: "On Fire for Phlox," June, 38. "Texas Trailing Phlox," June, 11.

Plant Poaching: "Poached Parklands," Oct., 19.

Roses, Wild: "Wild Roses," June, 10.

Shrubs: "Play It Again, Sambucus," June, 35. "Woodies From the Wetlands," Apr., 15.

Trees: "Dwarf Conifers," Feb., 25. "Fragrance of Fir," Dec., 10. "Golden Boughs," Oct., 25. "Mesic Counterparts," Oct., 9. "Patently Superior," Feb., 29. "Starting Trees Right," June, 13. "Woodies From the Wetlands," Apr., 15.

Urban Gardening: "Flora of the Big Apple," Apr., 12. "The Groves of Academe," Feb., 36. "The Moss Garden," Aug., 13. "Starting Trees Right," June, 13. "Tippy of the Jungle," Oct., 11.

Vegetables: "Carrot Capers," Apr., 13.

Vines: "Of Twiners, Tendrils, Hooks, and Blebs," June, 30.

Virginia Spirea: "Virginia Spirea," Aug., 9.

Wetlands: "Woodies From the Wetlands," Apr., 15.

Wintergreen: "Refreshing Gaultherias," Aug., 39.

Witch Hazel: "The Divine Witch Hazel," Apr., 8.

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