


American Horticulturist

April 1993

A Publication of the American Horticultural Society

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American Horticulturist

Volume 72, Number 4

April 1993

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APRIL'S COVER

Photographed by Mike Lowe

'Autumn Bugler', a reblooming tall bearded iris, was introduced in 1986 by Frank P. Jones, a resident of Crown City, New Jersey, who has since moved to Ohio. Jones bred his irises primarily for cold-hardiness. As a result, 'Autumn Bugler' will rebloom reliably throughout much of the country, although it lacks the wide falls (bottom petals) considered ideal by many irisarians. In her article beginning on page 23, Lucy Fuchs relates the history of so-called remontant irises and introduces the breeders of the best.

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

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COMMENTARY

In February I wrote about the role of horticulture in developing our aesthetic sensibilities. From the time we are children, we perceive in gardens statements about plants and ideas about our relationship with them. I urged American designers to build public gardens that enable us to experience gardening as a contemporary art form, rather than a philosophy of nature.

Now we turn to horticulture as a science, as it applies to the American Horticultural Society's commitment to education. Through horticulture we can transform the garden into a living classroom. The obvious strength of a horticultural education is an emphasis on "hands on" learning. Only through sowing, growing, and otherwise experimenting with plants will the student truly learn about plants.

For this reason, the Society is seeking funds for a project that will connect students in horticulture and related curricula through a database network to both private and public institutions offering horticultural apprenticeships. For example, second-year university students in a plant biology program will receive a brochure listing a wide range of possible apprenticeships, from a two-month summer program assisting potato breeders, to a four-month stint as a micropropagation lab assistant, to a nine-month internship in a botanic garden. We hope the students choose an apprenticeship, but simply learning about these options will lead them to contemplate the wealth of career opportunities within horticulture. The field needs talented, well-rounded young people. But recent cutbacks at federally funded universities have forced many horticultural education programs to scale down at the very time when students are expressing great interest in plants and their place in the environment.

Few sciences offer the rich mixture of elements that horticulture does. Horticultural knowledge can be as complex as plant genetics and as simple as the beauty of a single flower. But knowledge must be intrinsically compelling for a person to wield it with passion and purpose. When students first learn the scientific names of plants, the language of taxonomy organizes and orders their minds and lays a foundation of knowledge on which they will build a set of skills. Similarly, when a student learns the laws of inheritance, a previously hidden universe reveals itself. Yet the student soon discovers that meaningful knowledge is applied knowledge: every day, gardeners must test general principles against practical problems in their own back yards.

If you wish to find out more about the work the AHS is doing in education for students, please call Maureen Heffernan at (800) 777-7931. Please tell your local educators about our prospective apprenticeship network and our national children's symposium, August 12 to 14, in Washington, D.C. If you've already done so, thank you. We hope to see you at this exciting educational summit.

Finally, I'm pleased to announce that Helen Walutes has accepted the position of Executive Director. Her dedication both to the members and to River Farm will benefit AHS.

—George C. Ball Jr., AHS President





LETTERS

Et Too, BREW-tay?

It is an excellent idea to have a pronunciation guide in *American Horticulturist*. Nothing is more awkward for a beginner than to call *Stokesia*, STOKe-see-uh, when the local expert calls it stoke-EE-syuh. Even I, aged and experienced as I am, was embarrassed to find a Cornell botanist calling *Prunus serotina*, serr-O-tin-uh, when I had been calling it serr-oh-TEEN-uh.

In this part of the world there is even a division between those who call *Camellia* ca-MEEL-yuh and those who pronounce it ca-MALE-yuh. My Latin teacher would have approved of the latter on the grounds that "e" is pronounced "ay," as in "Et tu, Brute?" For this reason, she would agree with you that *rosea* is pronounced roh-ZAY-uh. But you give an inconsistent pronunciation for *brasiliense* as brah-zil-ee-EN-suh, when it should surely be brah-zil-ee-EN-say.

If people are asked to pronounce the same vowel differently depending on where it occurs, Latin becomes as unpredictable as English and there is little chance that a beginner will ever summon courage to pronounce an unfamiliar botanical name. Whereas in practice, if you pronounce vowels consistently, most Latin names can be pronounced correctly—or at least comprehensibly. *Karen Arms Savannah, Georgia*

We admire your struggle to pronounce botanical Latin correctly, but quibble with your conclusions. If your pronunciation is meant to reproduce the Latin of Virgil, then you shouldn't really be pronouncing "e" as "ay." The latter is a diphthong; the classical vowel was probably pure. The "ay" sound is as close as English normally comes to the long version of the Latin vowel, but the two aren't really the same. In any case, the "e's" in et, rosea, and at the end of brasiliense are short. Virgil would have said something like "eh" for these.

Our guide is not meant to reproduce classical pronunciation and we doubt your Latin teacher would take much comfort in it. We offer roh-ZAY-uh for rosea because we believe that's how American botanists

actually say it. But Virgil would have said something closer to ROH-zeh-ah.

Tree Histories and John Quincy

Could you let me know the issues and the subject matter of Susan Sand's other articles about trees? I thoroughly enjoyed her brief history of the dawn redwood (October). I've located a source for seedlings and I plan to order some soon.

The story about John Quincy Adams, "Sollace for a President," struck several responsive chords with me. As a youngster growing up in Salem, the Adams house was the first president's house I ever visited. I will take to heart his words, "This is encouragement for me to persevere in my experiments, which I would leave as at once a charge and an inheritance to my children." *Robert J. Griffin Ten Mile, Tennessee*

Susan Sand's other tree histories are on the Osage orange (October 1991), American beech (December 1991), American yellowwood (April 1992), and the empress tree (June 1992). Copies of back issues are available from the Society for \$5 each.

Delighted to Be Invited

I am a geographer with a passion for plants wherever I find myself. We have forty-three acres and our relief from work is gardening. We read some thirty to forty garden/plant books per year and subscribe to most of the conservation magazines. We always thought the American Horticultural Society was for professionals only. To our delight we received an invitation to join AHS last spring. We read every word of both publications. If we had to choose one society and one magazine it would be yours.

Botanical journals tell my husband (a civil engineer) more than he wants to know about plants and the horticultural magazines don't tell me quite enough. So we really come together on your publications. You have something for us in almost every article. Besides, the alternating format is cheaper and more environmentally neutral. *Sarah D. Hultmark Grand Junction, Michigan*

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OFFSHOOTS



BILL FIRESTONE

The World in My Garden

By Peter Loewer

Last year while visiting Scottsdale, Arizona, for a lecture I spent a night—by misfortune and not by choice—in a management-training motel. Unfortunately a great deal of flu was going around and the night before my turn on the podium, I came down with a fever and the associated major discomforts.

Sometime before midnight I wandered into the quasi-posh bathroom to douse my fevered brow with cold water. The faucet was one of the newer types with one handle that you push or pull to regulate the water's temperature. After nearly scalding my nose, the water cooled and I put my head down into the sink, chancing to look up at the usually hidden bottom of the faucet and see in neat letters: Made in Macau.

Macau! I hadn't thought of that Portuguese salute to fishing, fireworks, and fan-tan since Robert Mitchum romanced Jane Russell in the 1952 movie entitled "Macao." (RKO used the anglicized spelling.) This faucet came all the way to Ari-

zona, I thought, across thousands of miles of ocean, from an area about one hundred miles west of Hong Kong. How romantic! At that point the handle somehow moved and my nose was nearly scalded again.

The experience mentally transported me to one day last summer when I decided to take fifteen minutes out of a busy day to water some flowers. It was too hot and there were too many plants to carry the water in my watering can (made in Spain) so I decided to use the hose (no perceptible country of origin). Since we had an overabundance of rain last July, the hose was in a heap on the back terrace where it had been reclining since the previous fall.

Like especially unclean black snakes from an Indiana Jones movie, its five sections—which clamp together with plastic "quick-snap" connectors—lay unattached but solidly united in a tangled heap of rubber knots so thick it took fifteen minutes to straighten everything out. Then too, all hose sections were coated with liberal amounts of pine and oak pollen—mixed with dust—making this a messy job indeed. Within twenty seconds my clean pants were slashed with streaks of grime.

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Founded in 1922, the American Horticultural Society is an educational, non-profit, 501 (c)(3) organization that recognizes and promotes excellence in American horticulture. The Society strives to inform, educate and inspire people of all ages to become successful, environmentally responsible gardeners through the acquisition and dissemination of reliable horticultural information.

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Not wanting to succumb to being a “Type A” personality, however, I patiently tried to uncoil the various sections and line up their male and female plastic couplers.

Because I was dealing with ten ends plus three separate faucets, the combinations became irksome to say the least. In an embarrassing attempt at crossing sexual lines I would match male to male or female to female and finally, in a salute to Noel Coward’s “Let’s Fall in Love,” one coupling would not work with anything else. It was then that I noticed that some of the couplers were German and the others came from Taiwan, the Germans being bright orange and their Chinese counterparts a pastel tangerine.

Finally all were connected and the uncoupling couplers replaced. But when I turned on the water every connection leaked because I had forgotten to change all the hose washers. Time was when such washers were made of rubber and came from someplace like Akron, Ohio, stacked up in well-made and well-marked boxes. The boxes were easily stored in the garden shed along with all the other tools of the trade. But that was long, long ago.

Today hose washers come from Taiwan or Singapore—or Macau—where they are stamped out of green or yellow plastic, and come in flat sheets of about twenty, held together by small strands. These washers do not store well, having a tendency to fall behind other things. I finally found mine underneath a stack of old plastic saucers and began a routine of washer replacement that took another twenty minutes. Invariably one of the little pieces that hold the washers together would not snap away and prevented the washer from sitting properly in the brass part of the hose.

By now my pants (made in the Philippines) were wet below the knee and covered with dirt and grime from cuffs to belt loops. My shirt (a classic acrylic from somewhere in Asia Minor) was soaked with sweat and water and somehow pollen had gotten between my glasses and my nose where its irritation, if transferred to an oyster, would have produced a pearl. But I held my temper and did not raise my voice. I merely grumbled in the manner of a wolf pack in need of food.

Finally the hose was hooked to the faucet, carefully threaded around the various flower beds, and the system was go.

I returned to the faucet, turned on the water, and waited. Ten seconds—twenty seconds. At thirty seconds I realized that the sprinkler wasn’t sprinkling. It’s an old sprinkler that was made in Mexico. I walked back to the faucet (it, too, was made in Mexico) and turned the water off.

Then back to the garden to check the sprinkler connection.

Of course, it was full of dirt. I cleaned the plastic filter, reconnected everything and turned on the water, whereupon the sprinkler spewed forth various streams of water in graceful sprays but only in one direction. The oscillation feature, apparently jammed with dirt, was not working. Now in order to open and clean the sprinkler I needed two small pliers and a large screwdriver (both made in Japan). That took another fifteen minutes. So far I had spent almost two hours and still the job wasn’t completed. Like baking bread, my temper was rising.

Forty-five minutes later the sprinkler was ready to move. I hooked it up carefully and again placed it for the best water coverage. I walked back to turn on the water. I waited. It began to sprinkle but still wouldn’t oscillate. I examined it once more but could find no reason for its refusal to move. Oh, well, I thought, I’d keep an eye on the clock and change the direction in an hour.

Again I walked back to the faucet and turned it on. Ten seconds, twenty seconds. Nothing happened. Then I realized there was no water pressure. I went next door. They didn’t have any water either. It seems the city had chosen that moment to fix a fire hydrant three blocks away, the hydrant being some fifty years old (it was made in Birmingham, Alabama). I screamed and my wife came running out thinking perhaps an elephant had stepped on my foot.

After calming down and taking a seat under a shady tree, I wondered: Do they water flowers in Macau with a German hose? Do Germans water with Spanish nozzles? Do the folks in Taiwan ever use Portuguese washers? Do Mexican gardeners ever wear pants made in Peru? Do English gardeners use French boots? Would a French gardener ever use an English hose? Do Japanese gardeners use Chinese faucets? And since all these products have additional parts manufactured elsewhere around the world, what’s going to happen when my next sprinkler is made in Moscow and my next leaf crusher hails from Brazil?

I really don’t know the answers to any of the above questions, but already in my garden the Pacific Rim and the Common Market are at war with what’s left of North American industry and, frankly, it appears that I’m the loser.

And I thought I had problems with plastic washers.

Peter Loewer lives and writes in Asheville, North Carolina. His most recent book is The Evening Garden.

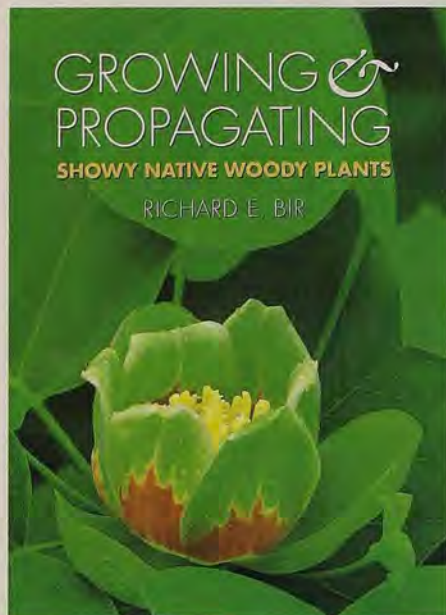
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BOOK REVIEWS



Growing and Propagating Showy Native Woody Plants

Richard Bir. University of North Carolina Press, Chapel Hill, 1992. 192 pages. 7¼" × 10¼". Color photographs and black-and-white illustrations. Publisher's price: hardcover, \$29.95; softcover, \$18.95. AHS member price: hardcover, \$26.95; softcover, \$17.

Many gardeners become curious about trees and shrubs they encounter in the wild and would like to cultivate them in their home landscapes. But finding sources for native plants is often a dilemma. For example, *Halesia diptera*, the American snowdrop tree, can only be found as a foot-tall seedling at specialty nurseries. *Aesculus flava*, the yellow buckeye (formerly *A. octandra*) and *Styrax americana*, the snowbell, both have wonderful spring flowers but are very hard to find in the trade. You are stealing when you remove a plant from the wild without permission, Richard Bir reminds readers of this book, and the act of removing it from its native conditions may kill it. Yet the plant propagation experience of novice gardeners is frequently too limited to start a shrub or tree from seed.

Using an informal and relaxed writing

style and everyday language, Bir, a professional horticulturist, lecturer, and experienced gardener, invites both novices and professionals to take a closer look at plants unlikely to be encountered at the local garden center. Having selected more than ninety plants rich in ornamental appeal, attractive to wildlife, or offering culinary adventure, he recommends at least one way to successfully propagate each of them without any special or expensive equipment.

The less ambitious will welcome his source list of nurseries that propagate their own stock, rather than collect from the wild. Bir reminds us that whether we buy these plants or propagate our own, we promote conservation by leaving natural habitats undisturbed while increasing the number of healthy, vigorous native specimens.

Bir says he wrote this book when he "found it impossible to ignore the fact that many of the most terrific plants are native to eastern North America." He defines the range of his selections as the East Coast from southern New Jersey to Georgia, but a considerable number of these plants grow naturally from Canada south to Florida, some west to Iowa, Kansas, or Michigan. Midwest gardeners will recognize serviceberry, persimmon, and black locust. Other selections such as loblolly bay or poinsettia tree would probably not survive a winter where I live in the Philadelphia area, but deserve our admiration.

Basic cultural practices, including soil preparation, planting, mulching, fertilizing, and pruning, are covered in a general discussion, as well as more specifically for each plant. Habitat descriptions with each plant give us clues to cultural requirements. Those whose gardens don't fit the ideal "moist but well-drained" site will appreciate the lists of moisture and drought-tolerant plants in his appendices.

Color photographs accompanying most plant descriptions serve both as an aid to identification and as an evocative portrait to trigger our imaginations for design possibilities. Most of us have mental images of flowering dogwood or American holly, but are unfamiliar with withe-rod viburnum or flowering raspberry.

Before you plant this year, no matter where you live, examine our showy natives. Bir suggests that one of them might be the plant you're seeking.

—Jeanne S. Frett

Jeanne S. Frett is assistant to the director of the Mount Cuba Center for the Study of Piedmont Flora in Greenville, Delaware.

GARDEN SHRUBS

and their Histories



ALICE M. COATS
With notes by Dr. JOHN L. CREECH

Garden Shrubs and Their Histories

Alice M. Coats. Simon and Schuster, New York, 1992. 223 pages. 9½" × 10¼". Color botanical prints. Publisher's price, hardcover: \$40. AHS member price: \$36.

Recently my seven-year-old asked out of the blue, "Who was Ringo?" My wife and I casually answered that he was one of the Beatles, assuming that the full context of rock music from the '60s and '70s went along with our response. He was obviously bewildered. Apparently having heard the name mentioned out of context in a recent movie, he had offered it as an answer to a quiz at school. He told us with some embarrassment, "I didn't know it was the name of a bug."

We gardeners find ourselves in a similar state of ignorance regarding the histories of plants we use so casually. In this historical reference work, first published thirty years ago, Alice Coats traces plant explorers, their patrons, growers, hybridizers, and others who played such an important part in the evolution of garden shrubs over the

HAVE YOU MADE A DIFFERENCE?



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last 200 years. Now updated with notes from former U.S. National Arboretum Director Dr. John L. Creech, it gives the thoughtful gardener a true sense of respect for the efforts and fortunes expended in the acquisition of plants for ornamental and breeding purposes for western European gardens.

In the context of today's diverse garden palette and the relative ease of international plant exchange and research, we lose perspective on the fact that many brave men risked life and limb in the pursuit of plants. We are casual enough to become plant snobs, assuming that the abelia, peony, or forsythia is too common for our sophisticated tastes. Clarke Abel, for whom the abelia was named, suffered both a shipwreck and an attack by Malaysian pirates in his efforts to return his horticultural treasures from China to England. All plants were lost except for specimens left behind in Canton with a fellow plantsman who was generous enough to return them once Abel had recovered from his journey.

In the 1820s, Philipp Franz von Siebold collected many plants in Japan, and in the process, a map of Japan as well. He was the only one of his party who escaped being beheaded for the latter privilege. Siebold was confined to Deshima Island in Nagasaki Bay for two years before he returned to Europe in 1830, carrying with him more than 400 plants, the first Japanese plants to reach the west, only to have them confiscated by the Dutch when they were intended for his patron in Belgium.

The specific epithets of *wilsoni*, *kaempferi*, *fortunei*, and *sieboldiana* should be seen as badges of courage. Educators often complain that plants are so passive that it is difficult to get children interested in them. Perhaps it's time to put many of them in the adventuresome context in which they were discovered and acquired.

Creech, who has led nine plant hunting expeditions to the Soviet Union and the Far East, includes some of those experiences in his notes following each entry in the text and succeeds in making this very British book relevant to the American gardener. My greatest frustration is that Creech doesn't say enough. He should write a book of his own! Explorations continue and more recent discoveries will add to the wealth of material our children will grow.

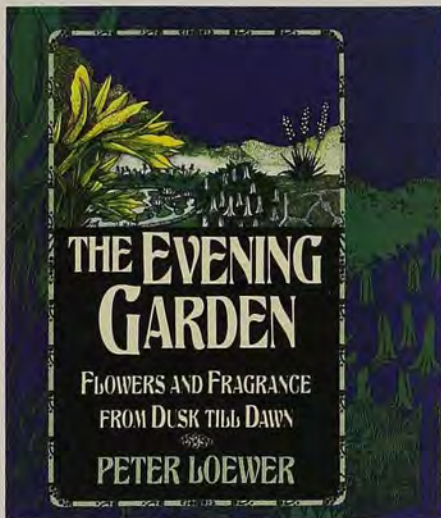
Perhaps it is natural that from generation to generation, we lose a clear understanding of previous eras. The introduction of a species a century or two ago may well seem of minor significance. But Coats's book reminds us that human history is intimately intertwined with plant history and that our destiny will in no small measure be dependent

on the destiny of the plant world.

It would be wonderful in twenty years for my grandson to ask, "Who was John Creech?" and for his father to answer: "He was a great plant explorer who waded through snake-infested streams to acquire a fragrant camellia for our garden." That probably won't happen. But at least there will be a good book in which he can look it up.

—Frank Robinson

Frank Robinson is the executive director of the Lewis Ginter Botanical Garden in Richmond, Virginia.



The Evening Garden

Peter Loewer. Macmillan Publishing Company, New York, 1993. 256 pages. 7½" × 9¼". Black-and-white illustrations. Publisher's price, hardcover: \$25. AHS member price: \$22.50.

Moonlit gardens and nocturnal plants have been neglected in garden literature and an entire book on these subjects is virtually unheard of. Now Peter Loewer has arrived to save the night. *The Evening Garden* can help bring twilight magic into your garden. Imagine stepping from a shadowy path into a garden twinkling with lights. Fireflies blink in the darkness and "the night-fragrant plants begin to send their Lorelei perfumes out on the evening air."

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—Amos Pettingill

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devoted to plants like *Dracula*, a genus of monsterlike orchids, and the bat plant, which sports sinister black blossoms surrounded by "a forest of black whiskers."

You may already be familiar with some of the plants Loewer writes about, but his references to folklore, history, and plant hunting expeditions and his ability to evoke images and scents add richness and depth to the descriptions. You'll look at your evening primroses in a new light when you see them through H. E. Bates's eyes. Loewer writes that Bates, known for his fiction as well as garden writing, had high praise for *Oenothera odorata* and "was especially fond of watching the flowers unfurl petal by petal, 'as if excited by some hidden spring, from the slender soft coppery buds.'" The common evening primrose isn't so ordinary when you think of it as "living by Dracula's clock," as Loewer does, or learn that some writers thought it gave off a mysterious phosphorescent light.

Poetry, literature, and horror movies also add resonance to Loewer's plant portraits. I think it's safe to say that no other garden writer combines Louise Beebe Wilder and Neltje Blanchan with Dorothy Parker, Sara Teasdale, and "Sherlock Holmes and the Spider Woman." Those details and Loewer's dramatic black-and-white illustrations make *The Evening Garden* a delightful journey into the twilight garden.

—Mary Beth Wiesner, Managing Editor

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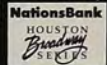
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The Iris Man of Baton Rouge

Joseph Mertzweiller's mission is to save, not to sell, Louisiana irises.

B Y C H E R Y L M . L A W R E N C E

Snakes don't spook Joseph Mertzweiller. As a boy, he shrugged them off as he waded through murky marshes near New Orleans searching for Louisiana irises. Mertzweiller knew even then that where you find irises, you'll find serpents. Known as "snake flowers" by the Cajuns who saw them growing in the swamps, the plants even smell like the reptile for which they are named.

"Snakes have a very peculiar odor; you can detect them by smell," Mertzweiller says. "The Louisiana iris is not fragrant; it's pungent. It has a smell not unlike the odor of a snake. But you have to get on top of the flower to smell it. A snake you can smell from a long way off."

In the 1930s and '40s, Mertzweiller collected the five species in the Hexagonae series and their natural hybrids from south Louisiana wetlands, then replanted the beardless wild irises in his mother's New Orleans garden. Louisiana irises are those species in the Hexagonae series—their number is still disputed—along with their natural and cultivated hybrids. (See box, page 20.) Today, the descendants of those uprooted plants flourish in his own garden in Baton Rouge, Louisiana, which displays the results of a half century of iris study and hybridizing. The retired Exxon research chemist's lifelong interest in and ceaseless promoting of Louisiana irises has earned him the respect and admiration of the horticultural community.

"I'm trying to do the same [hybridizing] work that he has done," says Farron Campbell of Garland, Texas, owner of Lone Star Iris Gardens. "You must do it yourself to understand the incredible work he did. At this point, we haven't fully realized the impact Joseph Mertzweiller has had on Louisiana irises. He's a true pioneer."

The American Iris Society awarded Mertzweiller its Hybridizer's Medal in 1984, and he was the 1992 recipient of the Distinguished Merit Award from the Society for Louisiana Irises. With Marie Caillet in 1988, Mertzweiller co-edited *The Louisiana Iris*, now in its second printing by Texas Gardener Press.

Mertzweiller, 71, and Helene, his wife of forty-six years, have registered some twenty-five Louisiana iris hybrids through the American Iris Society, including the first stable and fertile tetraploid hybrids, 'Professor Ike' and 'Professor Claude'. Named for Ira "Ike" Nelson, a professor of horticulture at the University of Southwest Louisiana in Lafayette, and Claude Davis, a Baton Rouge horticulturist who encouraged Mertzweiller in his work, the irises are a deep purple with bright yellow signals. "They are two beautiful



RIGHT: COURTESY OF JOSEPH MERTZWEILLER; OPPOSITE: CHERYL M. LAWRENCE

Above: 'Professor Claude' was one of the first stable and fertile tetraploid hybrids. Opposite: In Mertzweiller's back yard "laboratory," pollinated irises form three-inch seed pods in June.





PHOTOS COURTESY OF JOSEPH MERTZWEILLER

Top: One of Mertzweiller's current projects is to develop highly contrasting bicolors. He considers this as-yet-unnamed hybrid one of his best so far. Center: 'President Hedley' honored the head of the National Council of State Garden Clubs on the council's fiftieth anniversary. Bottom: 'Professor Jim'. Opposite: Mertzweiller named 'Ashley Michelle' after his granddaughter.

irises that look very similar because they were sister seedlings," Mertzweiller says.

'Professor Ike' and 'Professor Claude' represented two decades of work for Mertzweiller and were an enormous breakthrough in hybridizing Louisiana irises.

In the late 1950s, Mertzweiller became frustrated with the limited gene pool of the Hexagonae series. The plants are diploids, meaning they have only two sets of chromosomes, as compared with bearded irises, most of which are tetraploids, with four sets of chromosomes. The Hexagonae series will not cross with other iris series.

"You have twice as much genetic material with the bearded irises. There's more opportunity to bring the genetic features out," Mertzweiller says. "How to get a [Hexagonae] tetraploid: That was the question that faced me for twenty years. It's not easy to mess with Mother Nature."

In the early 1970s, Mertzweiller finally forced the Louisiana iris's diploid cell structure to become tetraploid, using the alkaloid colchicine, a derivative of the autumn crocus. It was a painstaking process with precious few successes.

The procedure involves soaking recently germinated seeds in a diluted solution of the colchicine. "You kill 80 percent of the seedlings, so you've got to treat a lot of them," Mertzweiller says.

The colchicine temporarily interrupts the plant's normal cell division. Some cells are "fooled" into behaving as though they have not yet divided, and they split again. From then on, each new cell will have twice the usual number of chromosomes.

"It changes the flower to a certain extent. The flowers tend to be slightly larger; everything on the plant is thicker and tougher," Mertzweiller says. The anthers and pollen also are larger. But the changes are so minute that Mertzweiller was not able to verify that they were tetraploids until he measured the pollen under a microscope.

Mertzweiller has an affection for educators and named all his registered tetraploids after professors. In addition to Ike and Claude, he has also honored Jim, Paul, Ellis, Barbara, Marta Marie, and Neil with professorial iris cultivars.

After using colchicine, Mertzweiller sometimes ended up with a "chimera," a plant part diploid, part tetraploid. Chimeras are not worth introducing, since future generations revert back to diploids.

Although Mertzweiller no longer works with colchicine, he continues to cultivate tetraploid hybrids to use for hybridizing.

"I'm trying to cross-breed the diploids with the tetraploids," he says. "But according to Mother Nature, this is a no-no. They are genetically incompatible. Only rarely can you get them to cross."

Infrequently, Mertzweiller ends up with a hybrid with three sets of chromosomes. "Mother Nature doesn't like triploids; they're sterile," he says. "I'm more likely to get a diploid or a tetraploid."

One of Mertzweiller's recent efforts has been crossing light-colored diploids with dark-hued tetraploids to enhance the color variation of his hybrids. A diploid that he registered last year is a brilliant red with a yellow center and yellow edging dubbed 'Cajun Sunrise'. Another of Mertzweiller's projects is to develop highly contrasting bicolor irises. One of his best so far—as yet unregistered and unnamed—has deep purple falls and white standards.

The flowers of most Louisiana iris hybrids range from pure white to dark purple, almost black. Most hybridizers are now going after new red-yellow combinations or are trying to make the contrast between the standards and falls more vivid, as Mertzweiller has done with these two. Breeders also want to enhance the ruffling around the edge of the iris segments. While the ideal form for bearded irises is strictly defined, the Society for Louisiana Irises resists adopting a fixed flower form, believing the medley of the flower types reflects the genetic diversity of the wild irises.

Mertzweiller's wife likes to help him find original names for his hybrids. When Mertzweiller produced what she calls "a fabulous yellow iris—the best yellow so far," they wanted to name it after Katherine Hedley, the president of the National Council of State Garden Clubs. "But the American Iris Society wrote us back and said the bearded iris people already had that name. So we called it 'President Hedley' in honor of the club's fiftieth anniversary."

When the national council held its annual meeting in New Orleans in 1979, Helene wanted it to be a special event that everyone (including President Hedley) would remember. With the help of a few other gardeners, the Mertzweillers transformed the Fairmont Hotel's grand ballroom into a modest-sized swamp.

"At midnight, when the ballroom became available, we brought in a truckload of stuff," Mertzweiller remembers. The "swamp" had two inches of water, a pirogue (small boat used by Cajuns), fake—but realistic—alligators and snakes,



WHAT IS A LOUISIANA IRIS?

The Louisiana iris has perplexed horticulturists and botanists for years. John James Audubon painted the beardless, water-loving plant into the background of his parula warbler and was the first to give the Louisiana iris its name. Several botanists also described the plant, but it remained virtually unknown until “discovered” in the 1920s by Dr. John K. Small, curator of the New York Botanical Garden.

Small was astounded by fields of irises he saw from the window of a train traveling through southern Louisiana and, in a frenzy of taxonomic zeal, he returned to study, photograph, and describe more than seventy species of irises. Small didn't realize that bees had been hybridizing the irises for centuries; he actually was “discovering” natural hybrids, and his descriptions thoroughly confused botanists and gardeners of the day.

The approximately 200 species within the genus are divided into subgenera, sections, subsections, and series. Louisiana irises belong to the series Hexagonae; it is extremely rare for any iris series to interbreed with another. However, Louisiana iris species hybridize readily with each other and there are many natural hybrids.

Whether there are four or five species within that series is still a matter of some debate. Small discovered and described the giant blue *Iris giganticaerulea*, a Louisiana iris that can reach an impressive six feet in height. Some experts argue that *I. hexagona*, which also has blue to blue-purple flowers, should not be considered a distinct species. *I. giganticaerulea* occurs only in south Louisiana, and possibly, in extreme southeast Texas, while *I. hexagona* is limited to Florida, Georgia, and the Carolinas. The giant blue is larger and more robust, but this could

be due simply to environmental differences.

Louisiana irises have a remarkable color range and are significant for providing the color red to the iris spectrum. Most are native to the Gulf Coast marsh areas from Texas to Florida, although the natural range of two species—*I. brevicaulis* and *I. fulva*—extends northward up the Mississippi valley. *I. nelsonii*, which has a native range limited to a small area near Abbeville, Louisiana, still has taxonomists arguing over whether it should be considered a distinct species or natural hybrid. According to Nelwyn McInnis, a botanist with the Louisiana Department of Wildlife and Fisheries,



Iris brevicaulis.

“Some taxonomists think it is a hybrid from *I. fulva* and *I. giganticaerulea*.”

I. nelsonii, notable for its handsome red and yellow flowers, was prominent in the development of many of the modern hybrids. *I. brevicaulis* is a dwarf species whose blue, blue-violet, or white flowers bloom inside the foliage and close to the ground and *I. fulva* is renowned for its coppery red flowers.

If the confusion within the series Hexagonae weren't enough, other series, particularly Laevigatae, sometimes are mistaken for true Louisiana irises. Also beardless, irises in the series Laevigatae include the blue- and white-flowering *I. virginica*, which is distributed in many southern and East Coast states, and *I. pseudacorus*, a widely distributed, vigorous European species with yellow or creamy flowers. Both species have a pronounced ridge running up the center of the leaf—which a true Louisiana iris does not have—and their foliage remains green after the Louisiana iris's foliage has yellowed.

—Cheryl M. Lawrence

recorded frog and bird clamor, and, naturally, lots of Louisiana irises.

Sadly, real swamp scenes with Louisiana irises are becoming rare. Fifty years ago the water-loving plants grew in the wild throughout the Southeast and north to Ohio, Indiana, and Kansas. Today less than 10 percent remain.

“There were tremendous stands of irises in southwest Louisiana, including huge fields of the giant blue (*I. giganticaerulea*) in Cameron Parish,” Mertzweiller says. “Those fields were measured in square miles in the early 1950s.”

In 1957, Hurricane Audrey pounded the Gulf Coast, driving salt water inland and killing most of the plants. “Some people say the irises were depleted because people collected them,” Mertzweiller says. “The collection was insignificant. The hurricanes were significant.”

The developing oil industry contributed to the disappearance of the wild Louisiana iris by draining the plant's native wetlands and by cutting hundreds of miles of canals through the marshes to haul heavy machinery, Mertzweiller says. Expansion of cities—particularly New Orleans—also hastened the demise of the giant stands of wild irises.

But while parking lots now occupy land where Mertzweiller once hunted snake flowers, their stunning progeny live on in his garden. Each morning during the blooming season—mid-March through mid-May in Baton Rouge—the hybridizer wades through the dense iris foliage that also serves as his laboratory. His iris beds, which contain thousands of plants, are raised slightly to make it easier for him to move around, although Mertzweiller concedes that the plants grow best in shallow water. “They can grow fine in a yard, but they're really water plants,” he says. In fact, year-round water is the single most important factor in the cultivation of Louisiana irises, he adds.

With a small handmade tool, Mertzweiller delicately scrapes pollen from the anthers of a test flower, then deposits the yellow powder in a glass vial. “You've got to get to the pollen before the bees do. A bee squanders it all over,” he says. Bumblebees find Louisiana irises irresistible and deserve credit for the confusing array of natural hybrids. Mertzweiller theorizes that they are drawn by the flower's brightly contrasting signal. Once drawn to an iris, the bulky bees find wide, sturdy falls that seem made to order as landing pads.

Mertzweiller pulls off these falls so bumblebees can't spoil the pollen. If the hybridizer is unable to pillage the flowers first thing in the morning, he sometimes covers them with small brown paper bags. But the paper bag trick has its drawbacks. "It gets hot early in the season, and the bags can cook the flowers," he says, laughing. "Then you won't get any seeds. I've gone through that."

Mertzweiller puts his glass vial of pollen in a jar with silica gel to keep it dry and stores it in the refrigerator. Later, he smears a pinhead-size drop of pollen on all three stigmas of the same bloom or of another flower. The pollinated plants quickly form three-inch-long seed pods, which Mertzweiller harvests when they turn golden in late June or July. Depending on the plant, he can get one seed or seventy from a single pod. Mertzweiller plants the seeds—which should germinate in October—in labeled pots.

"It takes two years before you know" if the new seeds will make an impressive hybrid, Mertzweiller says. "It may be good; generally, it won't be."

The process takes endless patience, but Mertzweiller doesn't seem to mind. He works with thousands of plants and registers about one new hybrid a year. Before he registers a plant, Mertzweiller likes to test it in friends' gardens throughout the United States, to assure himself that it will perform well in a wide range of conditions.

Mertzweiller refuses to garden for profit and doesn't have a nursery. He donates controlled crosses to the annual auction of the Society for Louisiana Irises, and the buyer takes full ownership. Some have been registered and won awards. "I don't sell irises," he says flatly. When the hybridizer is not tending to his plants, he's likely to be teaching others how to grow them. He travels the garden club circuit, explaining to eager amateurs that not every iris that grows in Louisiana—or is even native to the state—is a true Louisiana iris. In particular, *I. pseudacorus* of the series *Laevigatae*, with its yellow flowers and abundant foliage, commonly is mistaken for a Louisiana iris, as is *I. virginica*, or southern blue flag, of the same series.

The retired chemist also enjoys teaching gardeners how to cultivate the Louisiana iris. It's not hard: the plants like soggy acidic soil and lots of fertilizer. "They have voracious appetites. You can give them camellia or azalea fertilizer, or better yet, rotted manure," Mertzweiller says. He feeds his own



COURTESY OF JOSEPH MERTZWEILLER

Louisiana irises don't grow just in Louisiana. In Mertzweiller's collection is the award-winning 'Watch Out' from John Taylor of Australia.



'Cajun Sunrise' was registered in 1992.

plants in September at the start of the growing season in Baton Rouge and gives them an additional shot in late December or early January before the blooming season. Louisiana iris hybrids can be cultivated from South Dakota to South Texas, and from California to Connecticut; almost anywhere in the world, Mertzweiller says. In fact, some of the best hybrids are being developed in California and Australia. The plants thrive on a good mulching to protect their roots from sub-zero winter weather up North and scorching summer temperatures in the South.

"Louisiana irises are more and more rare in the wild. That's why we want people to grow them in their yards," Helene Mertzweiller says.

Joseph Mertzweiller says the natural hybrids seem to be disappearing faster than the species, but that even growing the cultivated hybrids is a step toward the conservation of *Hexagonae*.

Mertzweiller is generous with the tools of his trade. He donates sacks of iris rhizomes to arboreta and schools, then digs in the mud with students, showing them how to cultivate the plants. He is renowned for his generosity with fellow hybridizers and iris enthusiasts. Despite his popularity, Mertzweiller seems shy and self-effacing and is hesitant to talk about his accomplishments. His colleagues have no such qualms.

"The best thing about Joe Mertzweiller is that he's so willing to encourage those who are just getting started," says Farron

Campbell of Lone Star Iris Gardens. "He's one of those rare people who will do anything to help you."

Marie Caillet, who co-edited *The Louisiana Iris* with Mertzweiller, agrees. "What's most outstanding is what he's done to promote Louisiana irises," she says. "He talks to clubs all over the Southeast. He judges shows and teaches judging. He has strong feelings about doing things. A lot of people talk and do nothing. Joe Mertzweiller follows through on things."

Cheryl M. Lawrence is a free-lancer writer who lives in Baton Rouge, Louisiana.

SOURCES & RESOURCES

Society for Louisiana Irises, Elaine Bourque, Treasurer, 1812 Broussard Road East, Lafayette, LA 70508. Membership and quarterly subscription to the *SLI Newsletter* is \$7.50.

Suppliers:

Adamgrove, Route 1, Box 246, California, MO 65018. Catalog \$2, refundable.

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Irises for Autumn

After the spring fling, remontants give their all in fall.



COURTESY OF MIKE LOWE

North Carolina breeder Lloyd Zurbrigg produced this still-unnamed rebloomer.

BY LUCY FUCHS

In spring, like many gardeners, I look forward to seeing my perennial bed awash with irises, which make such congenial companions for other spring flowers like columbines, peonies, bleeding-hearts, and coralbells. But unlike most of my gardening friends, I don't feel a sense of loss when the spring bloom is over, nor do I feel compelled to compensate by filling in with chrysanthemums in the fall.

In my USDA Zone 6 garden, irises start reappearing at the end of July and bloom on and off until fall with a whole new and equally compatible cast of characters, performing a delightful encore with daylilies, Japanese anemones, and asters. These marvelous plants, almost too good to be true, are called reblooming or remontant irises. I have grown them for ten years in California, New Jersey, and Pennsylvania. In each garden, they have delighted me and astonished my neighbors, none of whom had ever heard of rebloomers.

Fifteen and even as recently as ten years ago, remontant irises did not compete well with "once bloomers" at iris shows, because they didn't conform to ideal standards of form. Their blooms were out of proportion to their foliage, or their standards to their falls, and their colors lacked sparkle. Many could not be relied upon to rebloom predictably in many parts of the country.

A gardener hungry for fall bloom might well ask, "Why so choosy?" As one official of the Reblooming Iris Society has said, "In August and September, what other iris is there with which to compare a remontant?" But in the past decade, reblooming irises have been improved greatly and now offer many of the same variations as once-



Top: Lloyd Zurbrigg, left, gives Maryland veterinarian Bruce Hornstein some suggestions about evaluating irises for hybridizing. Above: Zurbrigg's 'Northward Ho' reblooms well in northern climates.

blooming varieties: petals that are ruffled or laced, and bicolored flowers including dark-patterned plicatas; amoenas, which have white standards, and variegatas, which have yellow standards. Rebloomers have been developed among tall bearded, dwarf, border, and Siberian types.

The earliest record of a remontant was in John Gerard's 1597 *Herball*, which said the so-called *Iris biflora* came from Portugal and had a "purple or violet colour, smelling like a violet with a white hairie welt down the middle." It bloomed in spring and "flowereth againe" in fall, Gerard said, mentioning in the same section a smaller *I. violacea* of a deeper hue. In 1959, Edwin Rundlett proposed in a chapter in L. F. Randolph's book *Garden Iris* that these were probably not true species but hybrid derivatives of *I. aphylla*.

The species showing remontant trends were found in Italy, France, and near the Mediterranean, where there were many showier flowers with long blooming periods competing for attention. Apparently the remontant quality was not much appreciated for the next two centuries, because there is a dearth of accounts until the

1800s. There are records of a 'Lurida' collected by D. Solander in 1789, a 'Purple King' named by Wallich in 1830, and a tall bearded variegata, 'Gracchus', introduced in England in 1884.

The genetic origins of remontancy are still uncertain. In 1978, Raymond G. Smith, writing in the American Iris Society's *The World of Iris*, noted that rebloom has occurred in at least nine different species, in addition to natural hybrids. In a 1989 article in the *Reblooming Iris Recorder*, the periodical of the Reblooming Iris Society, Clarence Mahan singled out four—*I. variegata*, *I. trojana*, *I. pumila*, and *I. mesopotamica*—as the most influential.

Not until the 1920s and '30s did a handful of American hybridizers become interested in breeding for remontancy. They bred first for rebloom. Clarity of color, good form, and large flowers would come later. In 1924, Nebraskans Hans and Jacob Sass developed the first iris introduced as a remontant, the blue-violet 'Autumn King'. The Sass brothers' breeding was an international effort. They obtained *I. olbiensis* (now *I. lutescens*) and other dwarfs native



to Italy and France via nurseries on the Isle of Guernsey and in Germany. These were crossed with tall bearded irises to produce many remontants still found in gardens today. The 1933 'Eleanor Roosevelt' is one that remains a favorite.

J. C. Nicholls of Ithaca, New York, produced 'Surefire', a yellow intermediate bearded and, in the mid-'30s, G. Percy Brown of Barre, Massachusetts, crossed the tetraploid 'Autumn King' with a diploid of his own and, through further crossing and back-crossing, made many additional introductions, including 'Autumn Twilight' and 'September Sparkler'.

But unfortunately many of the rebloomers from that period, Smith wrote in *The World of Iris*, had "dirty hafts [coarse marks near the base of the falls], poor substance, snaky stalks, narrow parts, and muddy colors." In 1950 Smith began to look through the intermediate bearded irises for fertile parents and found five fertile tetraploids. By the mid-'70s he had registered thirty rebloomers. In 1980 he introduced 'Summer Olympics', a tall bearded yellow with a bloom as impressive as that of any more recent introduction.

All through the decade that I have been enjoying rebloomers, blissfully unaware that they had not yet reached perfection, other dedicated hybridizers have been working to give them the shape and predictability that would make them acceptable to a wider public.

Few are full-time breeders. Introducing a total of perhaps only ten new cultivars a year, they eventually produced remontants that win prizes even when exhibited with their once-blooming establishment cousins. It is now possible to find a rebloomer suited to almost any part of the country, although choices are somewhat more limited in the northern states, since the irises need an extended period of warmth and sun in order for the bloom to repeat. Rebloomers that are successful in the North tend to have an earlier spring bloom, so that the fall bloom can appear before frost.

The breeders who have helped make these lovely plants more available are a dedicated lot who come from many walks of life, but who are united in their efforts to enhance the beauty and performance of rebloomers and to bring them to the attention of more of the gardening public.



Top: Virginia breeder Clarence Mahan with his wife Suky. Above: Her namesake, 'Suky', a tall bearded rebloomer.



David Niswonger of Missouri produced the award-winning intermediate 'Honey Glazed'.

Virginia hybridizer and nurseryman Clarence Mahan is in "real life" the director of the U.S. Environmental Protection Agency's Office of Research Program Management. Although his first love is the Japanese iris (see "Hanashobu: The Romantic Japanese Iris," *American Horticulturist* April 1991), he has been working with remontants since he began hybridizing ten years ago. His reblooming 'Violet Music' won the High Commendation Award of the American Iris Society in 1990. Its violet bloom is ruffled and exceptionally large and it will rebloom reliably through USDA Zone 5.

Mahan's 'Suky', a tall bearded iris named for his wife, is considered the best example of a violet iris with white zonals. The falls are a deep violet with a distinct white center and the standards are a lighter violet that fades into the white center, so that the falls seem to be reflected in the standards. Because it is so new, it is not yet known where it will predictably rebloom.

Lloyd Zurbrigg of Durham, North Carolina, came to this country in 1958 from Ontario to get a doctorate in music and was a professor of music at Radford University in Virginia for twenty-eight years. An iris

grower and breeder for forty years, his most famous rebloomer is 'Immortality', a tall bearded white that came out in 1982 and remains one of the most popular remontants. But he calls 1985 his best year for hybridizing, since it produced two excellent blue seedlings: 'Sugar Blues' and 'Baby Blessed'. The latter was an offspring of his lovely yellow, fragrant dwarf, 'I Bless', which would win the American Iris Society's Cook-Douglas Award for the best dwarf iris in 1989. His 'Northward Ho' is a pink-brown blend that does well in cold climates. A promising newcomer is 'Silver Dividends', a cool white tall bearded that won a "Queen of Show" award from the American Iris Society Region 4 show last year. Anything but retired after leaving the university, Zurbrigg runs a small nursery in addition to his hybridizing.

Earl Hall, of West Alexandria, Ohio, describes hybridizing and running a nursery as "a hobby that got out of hand." At one time a chicken farmer and then a bricklayer, Hall devotes himself full time to nursery work. In addition to raising daylilies, peonies, and chrysanthemums, he has benefited the iris world with such notables as

'Jewel Baby', a deep purple standard dwarf that reblooms in many zones; 'Pink Attraction' and 'Violet Returns'; and 'Little Show Off', a white tinged with purple. One of his most popular cultivars is 'Queen Dorothy'. It has white standards and violet falls edged in white and, since it reblooms early, is a good tall bearded choice for the North.

David Niswonger started gardening in his off hours as a hospital administrator in Cape Girardeau, Missouri. His garden, he says, was his "stress unit" where he relaxed. Now he is retired from the public health field and owns his own nursery where he hybridizes and sells irises, daylilies, and daffodils. His 'Late Lilac', a lilac-colored tall bearded rebloomer, is almost twenty years old but has survived the test of time and shows up regularly on symposium lists as well as serving as parent to new cultivars.

More recently, his 'Champagne Elegance', a tall bearded with pale pink standards and apricot falls, has made its mark not only in this country but also in England, where it was displayed at the 70th anniversary show of the British Iris Society at Cannington, Somerset, last May. His



MIKE LOWE



JUNE HICKS



MIKE LOWE

Top: 'Jennifer Rebecca'.
Center: A yellow rebloomer makes a stunning contrast with Japanese anemones and sedum at the American Horticultural Society's River Farm headquarters.
Bottom: 'Champagne Elegance'.

'Honey Glazed', which has pale yellow standards and darker mustard yellow falls, won the Sass Medal for the best standard intermediate iris. Niswonger calls hybridizing a mixture of art, experimentation, and adventure. "You can't know in advance what will come from a cross," he notes.

Dr. John Weiler, past president of the Reblooming Iris Society, teaches botany and horticulture at Fresno State University. He is known for his dwarf rebloomers and for the scientific approach he uses in growing and hybridizing and in running his nursery. His first dwarf rebloomer, 'Baby Tears', introduced in 1980, has white standards and light yellow falls.

Weiler is extremely hesitant to name his favorite introductions, noting that even the most beautiful among them may not rebloom in climates less hospitable than California's. But he says both his dark red 'Plum Wine' and 'Refined', which has pale yellow standards with medium yellow falls, have rebloomed well over a wide area of the country. Both are standard dwarf bearded.

Of the hundreds of remontant irises to choose from, those that perform well in my Ambler, Pennsylvania, garden are Carl Wyatt's 'Corn Harvest', a rich medium yellow, and 'Spirit of Memphis', a cooler, more delicate shade of yellow from Zurbrigg. 'Corn Harvest' starts its rebloom in July and continues intermittently until frost. 'Spirit of Memphis' starts later and also continues until frost.

My very favorite is Zurbrigg's 'Immortality', a stunning white iris that appears to flower nonstop starting in July. It won an Award of Merit from the American Iris Society in 1989 and is frequently praised by others in the *Reblooming Iris Recorder*.

'Jean Guymier', a fifteen-year-old cultivar, is less prolific and while often described as pink, seems to me a subtle shade between pink and beige. It's less vivid than newer pinks and too pale for its current spot in the garden. This season I plan to order a rosier pink, Zurbrigg's 'Jennifer Rebecca', to replace it. But 'Jean Guymier' is so sturdy and dependable a rebloomer that I will find another place for it.

I'm also tempted by Niswonger's 'Champagne Elegance', Mahan's 'Violet Music', and 'Baby Blessed' from Zurbrigg, which is said to rebloom reliably over much of the country.

Before more gardeners will grow remontant irises, there is one remaining hurdle: large nurseries will have to overcome their caution about carrying rebloomers. Because rebloomers are beginning to receive

awards at iris shows, some big mail-order nurseries are beginning to carry the plants. But until recently, even those that did sell them were hesitant to assure customers that a particular cultivar would rebloom in the buyer's part of the country.

For now at least, remontants can be most easily obtained from small nurseries that specialize in rebloomers. They should be ordered in late summer or fall. The rhizomes need to get established before their first bloom and will sometimes skip their first season. But once you've experienced your first fall bloomer, the season will take on new meaning.

Lucy Fuchs is a free-lance writer who lives in Ambler, Pennsylvania.

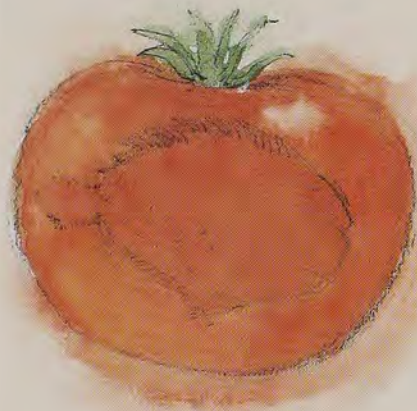
SOURCES & RESOURCES

The Reblooming Iris Society is a section of the American Iris Society. Howard Brookins, President, P.O. Box 965, Menomonee Falls, WI 53052. Membership and subscription to the *Reblooming Iris Recorder*, \$4. Cumulative checklist of reblooming irises, \$6. The *Recorder* carries a "Symposium Report" edited by Earl Hall. It is compiled from the experience of members throughout the country and notes which irises bloom in which zones.

Suppliers:

- Aitken's Salmon Creek Gardens, 608 N.W. 119th Street, Vancouver, WA 98685, (206) 573-4472. Catalog \$2.
- Avonbank Iris Gardens, Box 52444, Durham, NC 27717. Catalog free. (Lloyd Zurbrigg).
- Cape Iris Gardens, 822 Rodney Vista Boulevard, Cape Girardeau, MO 63701. Catalog \$1. (David Niswonger).
- Friendship Gardens, 2590 Wellworth Way, West Friendship, MD 21794. Catalog \$1.
- Garden of the Enchanted Rainbow, Route 4, Box 439B, Killens, AL 35645. Catalog \$1.
- Hall's Iris Garden, 1495 Enterprise Road, West Alexandria, OH 45381. Catalog free. (Earl Hall).
- The Iris Pond, 7311 Churchill Road, McLean, VA 22101. List \$1. (Clarence Mahan).
- Mid-America Iris Garden, 3409 North Geraldine, Oklahoma City, OK 73112. Catalog \$2.
- Rialto Gardens, 1146 West Rialto, Fresno, CA 93705. Catalog free. (John H. Weiler).

Biotechnology is about to bear fruit. What can we expect from the harvest?



BY CHRIS BRIGHT

A cross that produces polyester, a frost-resistant tomato that contains a flounder gene, and a cotton plant that makes its own pesticide: these are among the first creations of a new technology that promises to redraw the blueprints of life.

Genetic engineering is a set of techniques for manipulating deoxyribonucleic acid, or DNA, the complex molecule that makes up an organism's chromosomes. The techniques allow scientists to "edit" genes, or move them from one species to another, even when the species are as dissimilar as plants and fish. Such "transgenic" organisms could not arise naturally or through traditional breeding. Because there is no precedent for them, they have provoked great disagreement over what genetic engineering can do for us—and how dangerous it might be.

This controversy may seem remote from your garden, but transgenic plants will soon be a part of horticulture. Gardening applications of the new technology will be "spun off" from agriculture, as genetic engineers attempt to produce a new generation of miracle crops. And flowers themselves are serious business for biotechnicians. Because the genetics of flower color have been so intensively studied, common flowers like the petunia are often used as a proving ground for the new genetic techniques.

Commercial production is likely to follow the research. "The first transgenic ornamentals to go on the market will probably be plants modified for flower color," says Rob-

ert Griesbach, a plant geneticist at the Beltsville, Maryland, Florist and Nursery Crops Laboratory of the U.S. Department of Agriculture's Agricultural Research Service (ARS). A few such plants have already attracted growers' attention—though not their unreserved praise. In 1991, for example, Yoder Brothers, a nursery specializing in chrysanthemums, field trialed a mum genetically engineered to bloom in white, as a possible addition to their 'Money Maker' series. But Christine Kelleher, a spokeswoman for the company, says the plant did not prove stable enough to introduce.

Other ornamental traits may also be genetically engineered. Ralph Scorza, a horticulturist at the ARS Appalachian Fruit Research Station in Kearneysville, West Virginia, has found a gene that alters several features at once. Scorza has been working with *Agrobacterium rhizogenes*, the bacterium that causes "hairy root disease." Like many plant pathogens, *A. rhizogenes* is a natural gene splicer: it trans-



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CUSTOMIZED

fers some of its genes into a plant's DNA, causing its host to produce the thick root growth in which it likes to live. Scorza spliced an *A. rhizogenes* gene into tobacco—often used as a test crop because it is easy to work with—and found that the resulting plants tended to produce smaller, more plentiful, and earlier flowers. The gene also reduced the overall size of the plants and made the pollen less fertile.

Especially encouraging to Scorza was the fact that the gene's "expression"—the degree to which it affects the tobacco plants—varied from plant to plant. This variation could allow traditional breeders to fine tune the gene's effects. By breeding only those plants that show desirable levels of expression, growers might be able to use the gene to produce smaller, more floriferous varieties of many ornamentals. Scorza explains that his team was not the first to work with the gene. "But we're the first people who've looked at it in a horticultural sense," he says. "We thought it was a gene that had commercial potential—a gene whose time had come."

But genetic engineering will not soon replace traditional means of manipulating traits like flower color and plant size. An expensive new technology is not likely to be cost effective where established—and cheaper—procedures are available. "This type of work requires a lot of basic information and the cost is fairly high," says Griesbach. An attempt to engineer rose color at his lab, for example, "took two scientists and two technicians two years



just to figure out what pigments were involved. And that was just the first step."

Instead, most research in the field is directed at problems that traditional breeding has failed to solve. One of the most important of these is building resistance to disease, especially to viruses. Viruses are the scourge of the nursery industry. Infection is incurable and is spread by vegetative propagation techniques like taking cuttings, the standard method of reproducing perennials. A single virus group, the potato Y viruses or "potyviruses" for short, is the most destructive group of crop diseases in the United States today, causing estimated annual crop losses in the range of 5 to 20 percent.

One common potyvirus, the bean yellow mosaic virus (BYMV), is the target of a two-year-old genetic engineering project at Griesbach's lab. BYMV is a big headache for the cut flower industry. It has, for instance, infected Florida's \$13 million com-

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mercial gladiolus crop, forcing growers to replace their stock every two years, after it becomes too weakened to use. But last January, Griesbach, plant pathologist John Hammond, and plant physiologist Kathryn Kamo achieved what may be an important victory against it. The researchers reversed the chemical message in a BYMV gene, then spliced this "antisense" gene into tobacco DNA. The species of tobacco used is highly susceptible to BYMV, but most of the resulting plants showed at least partial resistance and some appeared to be immune. The scientists aren't sure exactly why the antisense gene confers resistance, but they believe it produces RNA that binds to the corresponding RNA in the invading virus, thereby preventing it from functioning. The team estimates that their gene might be available for plant breeders in two to five years.

Other problems that have frustrated traditional breeders may also be yielding to the new techniques. At his Kearneysville lab, for instance, Scorza is exploring the complex process of ripening in tree fruit. Scorza would like to temporarily switch off the genes that cause ripening fruit to soften, while allowing other aspects of ripening to continue. Delayed softening, he explains, would allow growers to pick their fruit later in the season, because they would not

have to worry about shipping damage. And fruit picked later should approach the quality of "fresh picked" fruit.

In this area too, commercial production is imminent. The first delayed-softening crop, a tomato called the 'Flavr Savr', has already been produced by the biotechnology firm Calgene, based in Davis, California. 'Flavr Savr' is now awaiting approval by the Food and Drug Administration, which must decide if there are any health risks associated with its engineered gene, an antisense copy of the gene that produces a fruit-softening enzyme.

Another major aim of the new technologies is developing pesticidal plants. One strategy for doing this has focused on *Bacillus thuringiensis*, or Bt, a bacterium commonly used as a biopesticide. Researchers have spliced a Bt gene into a large number of crops, including tobacco, cotton, tomatoes, potatoes, rapeseed, rice, corn, apple and walnut trees—even the Allegheny serviceberry (*Amelanchier laevis*). Plants armed with the gene may be able to synthesize the toxin that makes Bt poisonous to caterpillars. When a leaf-chomping caterpillar sits down to dinner, such plants may be able to bite back. Another cornucopia of crops is being engineered to tolerate herbicides that presently kill them. Developers argue that herbicide-tolerant crops will greatly increase the

In the ARS Florist and Nursery Crops Lab, plant geneticist Robert Griesbach pollinates a transgenic petunia. The genetic makeup of the resulting seeds will be analyzed to see which genes were passed on.



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range of weed control strategies available to growers. No pesticidal plants are on the market yet, but both herbicide-tolerant and Bt crops are in the field trial stage.

It's too early to say where these developments will lead. "We're really at the infancy of this type of work," says Scorza, "and we don't know how effective it's going to be." Griesbach cautions that while simply locating a useful gene is not hard, making it do what you want can be extremely difficult. That observation is borne out by the field tests. Researchers at the University of Mississippi, for instance, found that Bt cotton has a much lower yield than its parent variety—an effect that has yet to be explained. And Yoder Brothers' Kelleher reports that the engineered white mum bloomed late, was too short, produced flower mutations, and tended to turn pink in cooler temperatures.

Even deciding what you want to do can be a challenge. "In biochemical terms," asks Griesbach, "what is drought resistance? Or increased yield? We just don't know enough biochemistry on these things in order to change them." By trying to engineer genes for traits that are not yet biochemically defined, he says, "we almost have the cart before the horse." Griesbach cautions that genetic engineering should be seen as a supplement to traditional breed-

ing—not a replacement. "All gene transfer does," he says, "is introduce new genetic material that the breeders can then use to create a new variety."

But there are larger issues at stake here too. Critics worry about the environmental effects of some transgenic plants. Herbicide-tolerant crops, for instance, are frequently criticized because they may encourage dependence on high-input, chemical agriculture, at a time when many agronomists argue that we need to move in the opposite direction. "Genetic pollution" could be another serious liability: since many crops interbreed with their wild relatives, engineered genes might "escape" into wild plants. Once on the loose, the new genes might alter the behavior of their hosts or that of the organisms associated with them.

In the United States, for example, one candidate for genetic pollution is a plant called "red rice," our most formidable rice weed—and a member of the same species as the crop itself. In developing countries, where most of our crops originated and where most of their relatives grow, the potential for genetic pollution is much greater.

Such problems make thorough risk/benefit assessments essential, according to Jane Rissler, a biotechnology specialist for the National Wildlife Federation. And Rissler doubts that many of the engineered plants would pass that test. "We think that

Calgene's 'Flavr Savr' tomato, genetically altered to delay softening, promises to be one of the first transgenic crops on the market.



At the ARS research station in Kearneysville, West Virginia, researchers combine genetic engineering with traditional breeding to improve fruit trees. Here, horticulturist Ralph Scorza (foreground) and plant physiologist Michael Wisniewski collect shoots from an evergreen peach, to study its cold hardiness.

the possibilities have been overblown,” she says. “We would argue that the benefits are likely to be very low. We think there should be less emphasis on biotechnology and more on sustainable agriculture.”

Despite its flaws, the new technology is seen in a mostly positive light by horticulturists not involved in its development—even by those with a public record of environmental sensitivity. Robert Ornduff, professor of integrative biology at the University of California-Berkeley and a curator of the university’s botanical garden, has called the introduction of alien species into wild ecosystems “an inexcusable act of environmental vandalism” (see “Members’ Forum,” *American Horticulturist* News Edition, September 1991). But Ornduff is enthusiastic about the development of transgenic plants. “These sorts of things are really quite exciting,” he says. “My general belief is that, by and large, while the techniques are unconventional, what these people are doing is not very different from what traditional breeders do.”

Gary Koller, senior horticulturist at Harvard University’s Arnold Arboretum, has written several articles recently on the value of native plants and the disruption caused by invasive exotics. But Koller also sees important potential in genetic engineering, particularly for disease resistance. “If you could impart virus resistance,” he says, “that would be tremendous.” But, he adds, “we have to do this with a great deal of caution. I think what people fear is that we’re going to let something out into the environment and it’s going to do something unexpected.”

The unexpected is exactly what concerns critics like Rissler. She says the current enthusiasm for genetic engineering reminds her of the hype surrounding the development of organochlorine pesticides like DDT. “The industry,” she says, “is basically offering this as another magic bullet.” To show how unpredictable the technology might be, she mentions two risks that virus-resistant plants might pose. But to understand their problems, you have to take a close look at how such plants are supposed to work.

Plants engineered to be virus resistant have had a viral gene implanted in their DNA. The gene may come from a virus similar to the one the plant is meant to resist or it may be an altered gene from the offending virus itself. Like the plant’s normal genes, the new gene produces messenger RNA (mRNA), which in turn produces a protein. But this mRNA will closely resemble a part of the offending virus’s RNA



and the protein will be very similar to one in the virus's protein coat. When the virus enters a plant cell that is producing these viral molecules, it may not be able to reproduce. At least, that's what seems to happen when the system works, although scientists do not yet fully understand the mechanics of the process.

What scientists do know is that to reproduce, a virus takes off the protein coat that covers its RNA. Once free, the RNA copies itself. Each RNA molecule then assembles a new coat, and there are two viruses instead of one. But sometimes, if a lot of protein coats are floating around, the RNA gets "confused" and puts on the wrong coat. This phenomenon, called trans-capsidation, is known to occur in nature. In a virus-resistant plant, it could mean that a virus would end up wearing the viral protein the plant itself is producing. Little is known about how coat proteins work, but in some aphid-transmitted viruses, the coat appears to determine which species of aphid the virus can ride on. Change the coat and you might change the aphid. And since different aphids visit different plants, the disease may spread to plant species never before infected. The next time such a virus replicates it would of course make a new copy of its old coat, but there is no way of knowing how it would affect its new host.

The other risk involves the RNA itself. When viruses are reproducing quickly, they may exchange chunks of RNA. Called template switching, this process too has been demonstrated in nature. In a virus-resistant plant, template switching might cause a virus to incorporate some of the plant's viral gene. (The gene would be vulnerable when it is copied into mRNA.) By offering the virus new material for template switching, we might end up engineering the virus as well as the plant. In combination, trans-capsidation and template switching could conceivably produce a whole new disease: a different virus with a different host range. Such problems are likely to be very rare, Rissler says, but at present we don't have adequate procedures for evaluating these and similar risks.

Understanding the risks is difficult, but Koller argues that when it comes to trouble, "it's not so much the technique as the application." In other words, we need to decide what we want from our powerful, new technology. And given its rate of development, we need to decide now. For good or ill, genetic engineering will be a growing presence in our lives. "We can't stop it," Koller says. "It's going to happen."

Chris Bright is assistant editor of American Horticulturist.

Video equipment hooked up to a microscope allows Robert Griesbach to look into a petunia cell's nucleus, as he prepares to inject a new chromosome into it.



Zen and the Art of Pruning

An American in Japan reconsiders the virtues of plant discipline.

B Y J U D Y G L A T T S T E I N

Not long ago my concept of perfect pruning was to not do any. The tree or shrub or perennial I chose to grow would be so ideally suited to its location that none would be necessary. However, there are gaps between this hypothetical ideal and reality. Plants are not always aware of our desire that they grow “so big” and then stop. We have all seen street trees ill-chosen for their location, butchered into shape for the passage of electrical wires, or cramped against a building. I remember a house we rented in Pittsburgh where a tunnel had been carved between the two blue spruces straddling the front walk. No doubt they had been planted as charming youngsters and had matured into forest giants. In winter my children (then quite small) and I would clasp hands, yell “Avalanche!” and dart beneath the snow-laden boughs. Then there was the neighbor’s house that might as well not have had any living room windows, so effectively were they screened behind a veritable Black Forest of overgrown rhododendrons. The opposite situation was represented by the lady down the street who must have been into horticultural cubism. All her yews and azaleas and the forsythia hedge were rendered into geometrical forms.

Most of us fall somewhere between the extremes of rigid control and laissez-faire growth. Today there is a trend in horticulture to follow nature’s design and to use plants that, although they might originate from different continents, look as though they belong together. This plant-community approach permits plants to interweave and create a tapestry effect. Pruning is more in the nature of heading back any particularly rambunctious individual, with the intent of so judiciously reducing it in size that no one is aware that it has been pruned at all.

The more manipulated effects are those of production agriculture—orchards, berry bushes, and such; or of the formal landscape—parterres, topiary, knot gardens.

Just as the population of the United States is polyglot, our horticultural style admits a diversity of fashions. Whether the garden in question is on a rooftop, a handkerchief-sized townhouse terrace, city lot, suburban yard, or grand estate, there are options available for each, whether formal, informal, cottage, or naturalistic. Give ten gardeners the same palette of plants to work with and I’d warrant the results would be ten gardens strikingly varied in their placement and combination.

Even as American gardeners are advocating individuality, they are busily widening their horizons, not narrowing the focus. Visits to botanic gardens, garden tours, and horticultural courses for personal enrichment are widespread and popular.



PHOTOS BY JUDY GLATTSTEIN

A meticulously pruned wisteria forms a beautiful canopy at Utsunomiya-shi park (opposite). At Tokyo’s Jindai Botanic Garden (above), white-gloved volunteers minister attentively to their plants.

While I have no desire to create a stately knot garden with interwoven ribbons of santolina and germander, lavender and boxwood, I can admire beautiful examples such as those at the Brooklyn Botanic Garden or the Garden Center of Greater Cleveland. The topiary garden at Longwood Gardens is formal and elegant, with yew surgically clipped to form a precise display. Contrast this with the enchanted disorder of the wild garden at Wave Hill in Riverdale, New York, where through self-sowing and spreading roots the plants themselves often determine their particular location and combination.

Certainly gardeners begin by relying on the advice of others, whether friends and neighbors, relatives and teachers, or books and garden tours. But each of us strives for an individual style, not mere duplication. We are free to reach for a combination of freedom and restraint that satisfies our particular temperament. What then in a country with a homogeneous population and a very powerful sense of tradition and established style?

In May 1992 I was in Kobe, Japan, as keynote speaker at an international symposium sponsored by the Hyogo Prefectural Government, the Hyogo Afforestation Corporation, and the Hyogo Horticultural Institute on improving the quality of urban life with plants. The sponsors were kind enough to arrange three days of visits to nearby public gardens, temple gardens, and castles prior to the symposium. Afterwards I stayed on for ten days with some Japanese friends to visit gardens and natural areas elsewhere in the country. It had long been a dream of mine to visit Japan. I have been entranced with their garden style ever since visits to the serene hill-and-pond garden at the Brooklyn Botanic Garden. In those years they even had a re-creation of the famous Zen contemplation garden, Roan-ji—fifteen stones in a rectangular sea of raked gravel with the only plants a few small patches of moss. There are superb Japanese style gardens at the Missouri Botanical Garden in St. Louis, the Chicago Botanic Garden, and at Washington Park in Portland, Oregon. Now I would have the opportunity to see, in context, austere contemplation gardens such as the original Roan-ji and the Silver Pavilion in Kyoto, and hill-and-pond style gardens such as Soraku-en in Kobe and Rikugi-en in Tokyo. Moreover, I would see what current, modern horticultural styles exist today in parks and public spaces in these cities.

Horticulture is alive and thriving in



ANITA SABARESE



COURTESY OF WAVE HILL



JUDY GLATTSTEIN

These yew topiaries at Longwood Gardens reflect the most formal of American garden styles (top), while the gardens at Wave Hill in New York represent American naturalism at its best (middle). To protect the bark, conscientious Japanese arborists wrap transplanted trees in burlap and jute rope (bottom).

Japan. On the rooftop of a department store in Tokyo, a garden center was offering small trees, especially Japanese maples, shrubs (I remember some beautiful hydrangeas, both mop-head and lace-cap varieties), superb tree peonies in bloom, perennials such as *Rohdea japonica* in a variety of cultivars, native plants such as *Arisaema ringens*, orchids such as *Calanthe* spp. and *Cypripedium japonicum*, bonsai for 75,000 yen (approximately \$600) and up, trays of moss. Sidewalks in Kobe were edged with pottery containers and tin cans filled with healthy perennials, perhaps a shrub such as hydrangea, or annuals—especially pansies, since this is the city's designated flower. Some of the containers were quite lovely, but none were chained or locked into place. Respect for property is a powerful influence within Japanese communities.

The smallest space in front of a building was often exquisitely planted. But I began to notice a similarity, a sameness in these entry gardens. There would be a pine, carefully trained and pruned to approximate a wind-shaped, mountain-grown specimen. A shrub, perhaps an azalea, maybe an aucuba, would be nestled against a water-worn boulder at the base of the tree. Perennials were chosen more for foliage effect than for flowers. Frequently seen were ligularia, ferns, astilbe, a smaller range of hosta than we generally use in the United States. The gardens were immaculate, precise, subtly, manfully, alike. They were all variations on the same theme. None that I saw were as bold, exuberant, showy, or unique as we have come to expect from American gardens.

In Japan, there is an emphasis on heritage: the use of traditional materials, even if only in a symbolic form, indicates a consensus about daily life and its requirements. Uniforms hold an honored place. Taxi drivers wear white gloves and all schoolchildren, from kindergarten up, dress identically. The day I was in Kyoto it seemed as though the entire middle school population had been turned out into the streets. Without exception, the girls were dressed in navy blue middie blouses and pleated skirts and the boys in navy blue trousers and military jackets. To the Japanese way of thought it is a matter of appropriateness. And this holds true in daily life, in behavior, even in gardening. People are expected to conform; their plants also are shaped into an idealized pattern.

Thus almost all Japanese gardens have recurring traditional elements. Gardens



like Soraku-en and Rikugi-en will have a pond, a bridge, a pavilion. There will be a venerable pine tree leaning over the water in which the carp trace indolent patterns. An azalea, carefully pruned, wears a brocade of vivid magenta flowers that scatter on the ground beneath, a reminder of the passage of time. There are few flowering plants—the traditional cherry, pine, bamboo, and azalea. The beautiful wisteria I saw on an arbor at Utsunomiya-shi public park was meticulously pruned and trained in the Japanese fashion, whereas we American gardeners tend to let the vine grow rampantly. Tree peonies are cultivated both for beauty and culinary purposes—the blossoms are edible. (I was served this while staying with my Japanese friend, Takeo Nihei, and his wife after the conference. The rather concise recipe I was given is as follows: 1) Pluck the flower while it is at its young stage. 2) Boil lightly. 3) Seasonings: vinegar, sugar, a little salt, and a little soup made of dried bonito slice.) In autumn there would be chrysanthemums. However, there is no counterpart of our colorful herbaceous border of perennials and annuals, nor did I see plantings of spring bulbs such as tulips. The mixed border is exotic, foreign in Japan.

The venerated ideal, developed during the Edo period when samurai were trained in war but lived in a time of peace, was the cultivation of certain selected container plants. An exhibit at the Jindai Botanic Garden in Tokyo, assembled from private

collections, had these classical plants displayed in ornamental containers whose style is also prescribed. For example, there were numerous forms of *Rohdea japonica*, with variegated or pleated or contorted leaves on normal sized or dwarf plants. These are acknowledged as “gentleman’s plants,” and their cultivation continues today. The same period saw gardens as a place suitable for contemplation, the inspiration for poetry, the tea ceremony. And within such a garden there was no room for originality. Even today. Each garden I saw was unique, but unique within the centuries-old guidelines for garden design.

Our own predilection for worry-free, self-sustained gardens tends toward the opposite extreme. An old Chinese proverb—and Japanese gardening is established upon this adopted foundation—says, “The best fertilizer for the land is its owner’s footsteps.” But American gardeners are all too often absentee gardeners. Too many American gardens are predicated on that wretched concept “low maintenance,” resulting in boring expanses of pavement, junipers, evergreen ground covers. No maintenance, also no interest. For my own garden I elect reduced maintenance: most of the plants I grow do not need staking, spraying, or deadheading. Naturalistic results: self-sowing plants such as *Pulmonaria saccharata* and *Helleborus foetidus* add a casual effect, shrubs grow unpruned.

Gardening is about time, about making conscientious observations, paying prudent

Like so many of our street trees, these amputee elms were cramped against a building and butchered to fit their space.



GALEN GATES

Sheer artistry or sheared catastrophe? Motorized clipping and a production-line technique turned this crab apple tree into a giant mushroom.

attention. In Japan, any job worth doing is worth doing well. Street trees in Tokyo are securely braced, and the support is reminiscent of a tori gate. Shrubs will have sturdy bamboo canes for a prop. All transplanted trees, large and small, have their trunks wrapped with burlap, jute rope, or straw matting, to protect the bark. This wrapping extends at least to the first, often to the second set of branches.

Conifers are pruned in spring. Our technique is based on a fast pass with a hedge clipper, sometimes motorized to make it "easier." In Japan the technique is a patient hand trimming, pinching back each candle one by one. This reduces the length without cutting any needles, and thus leaves no awkward, unsightly stubs. At the Jindai Botanic Garden in Tokyo, this work was done by volunteers. The man I spoke to was retired, enjoyed his time in the garden, and the value of his efforts. He was dressed in a neatly pressed khaki uniform with puttees, sleeve protectors, and he was wearing gloves to protect his hands. On a spring day after my return, I watched a worker at a local Connecticut nursery removing spent flowers from unsold plants of *Pieris japonica*. Granted, there are differences between a public garden and a retail store. But what I was interested in was his approach to the task of pruning. His clothing was casual, he was using clippers, the intent was clearly to do a good thorough job but speed was top priority: Do it quickly and get on to the next task.

The shop at Jindai Botanic Garden was selling bearded iris. Each rootstock was neatly wrapped in brown paper to protect the roots. A fan of fresh green leaves jauntily arose from this, and a label with a colored picture was rubber-banded to the wrapper. Here I see them with no wrapping, with one color picture stapled to the box in which they're tossed together. The message conveyed at the Jindai garden, again, is that a job worth doing is worth doing well.

Kyohoko, the translator who accompanied me for three days prior to the conference, told me her father had a fine garden in Hime. He takes care of this garden by himself, except for the three pine trees. Once a month a specialist comes at some expense, perhaps to prune, perhaps only to examine these trees and assure their continued proper growth.

And what have I learned from this trip? Most important, I think, is to focus, to concentrate on the task at hand. All too often I am looking ahead to what must be done next and not giving my full attention to what I am actually doing at the moment. A task begins with the preparations. My college instructor for *sumi-e*—ink brush painting as concise as haiku poetry with the same depth of interpretation of the natural world—said that a drawing begins as you grind the ink and focus. A friend who is a potter talks to me of centering, meaning more than the balance point of the mass of clay on the wheel. To a degree, keep it simple. Good design does not come from acquiring every plant that happens to catch my fancy in a garden, at a nursery, or described in a book. And while my personal style is not so organized, not so manipulated as the Japanese manner, pruning for shape rather than just control is now seen as permissible, even necessary. While precise, geometric shrubs would be incongruous in my informal, naturalistic garden, some restraint of exuberant growth to create form rather than allow a leggy, tousled appearance is an improvement. "Natural" does not mean "do nothing." After all, what I have is, I hope, a garden. And that implies a certain sense of orderliness, of imposed discipline, of design. So cautiously, judiciously, I am putting to use the two pairs of clippers and the pruning saw I brought home from my trip.

Judy Glattstein is the author of Garden Design With Foliage and the editor of Gardener's World of Bulbs.

A Small Flowering Cherry for the Future

From the slopes of Mount Fuji, an ornamental perfect for today's cramped landscapes.

B Y J O H N L . C R E E C H

For more than a thousand years, flowering cherries have been among Japan's most beloved spring flowers. In the mountains above Kyoto at Arashiyama, along the Katsura River, the banks and hillsides are lost in the billowing pale pink drifts of the mountain cherry, *Yama-zakura* (*Prunus serrulata*). It is when cherries are seen in such vast numbers that they are most breath-taking. Throngs take time

to view them, wandering under their branches or picnicking amid the scattering petals. It is a time of mixed emotions. Winter is gone, but everyone is acutely aware that the life of the cherry blossom is a short one.

Visitors to the area around Mount Fuji will see clouds of the pink-to-white blossoms of a smaller cherry, *P. incisa*, which blooms from late March on the Kanto plain to May on Fuji's slopes. There, and in the nurseries and gardens around Gotemba, it

is easy to see this species' great variability. Japanese nurserymen have taken advantage of it, selecting dwarf and upright forms, flowers from white to deepest pink, double flowers, variegated leaves, pendulous branches, and autumn blooms. In the Japan Sea region of Toyama, there is a beautiful dwarf with deep red double flowers, *P. incisa* var. *kinkiensis*. Japanese publications describe a number of natural hybrids.

In Japan, the Fuji cherry's common name is *Mame-zakura* or *Fuji-zakura*. "Mame" may be translated as miniature and "Fuji" refers to its natural habitat. I first encoun-



COURTESY OF JOHN L. CREECH

Thousands come to view the mountain cherry, Yama-zakura, blooming in the mountains above Kyoto.



The first cherry trees given to the United States by Japan were infested with insects and had to be chopped up . . .



'Okame' was bred seventy years ago by English plant explorer Collingwood Ingram.

tered *P. incisa* in 1947 when I was working at the Glenn Dale, Maryland, Plant Introduction Station, where a small specimen grew on the lawn in front of the residence. Among the grand assemblage of beautiful, named varieties and graceful forms of *P. subhirtella* there, it did not create much of an impression. But later, after I had seen it several times profuse with flowers in massive thickets around the base of Mount Fuji, my impression of its virtues improved.

Maturing at a height of eight feet, *P. incisa* is as small as many shrubs, with purplish brown bark and delicate branches. The leaves are especially small for a cherry and finely toothed. Consequently, it is often used as a bonsai subject. The pink to white flowers are in clusters of one to three, somewhat pendant on short stalks. This pendulous habit allows the flower's bright red calyx to be seen behind the petals, creating a bicolored appearance.

Designers and gardeners limited to average-sized urban and suburban landscapes are always looking for interesting trees that will mature quickly but not overgrow their

space. In six years, my *P. incisa* specimens not only reached flowering size, but flowered profusely, forming a fine-structured, well-branched shape.

But Japan's many varieties and natural hybrids of the Fuji cherry, all in sizes perfect for today's gardens, aren't available in the United States. Cherry trees are extremely susceptible to viruses and federal import regulations classify all *Prunus* species as "prohibited."

Cherry seeds can be brought into the country, but they will not necessarily produce a tree like their parent. Budwood cuttings must undergo quarantine and testing that can take five or six years.

Because the quarantine procedure is expensive and time-consuming, the regulations essentially assure that no new cultivars will be introduced from abroad. Valuable collections brought to the United States in more lenient times have been decimated by viruses in the intervening years.

But just a few months ago, the U.S. National Arboretum sent out several *P. incisa* hybrids for evaluation around the



... and burned. Three years later, 3,000 healthy trees took their place around the Tidal Basin and other Washington sites.

country. These trees are the fruit of collecting expeditions by Roland Jefferson in the 1980s; a thorough culling and then hybridizing by the late Donald Egolf, head of the arboretum's shrub breeding program; and final selection by research geneticist Randy Johnson.

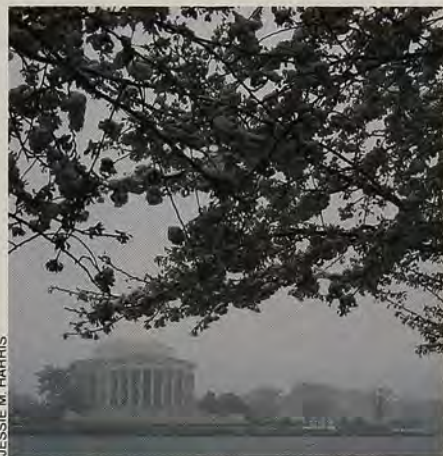
Of course, this is not the first time that we will have a team of plant explorers and breeders to thank for a new plant to enhance our gardens.

It was an English plant explorer named Collingwood "Cherry" Ingram who probably did the most to bring ornamental cherries into western gardens. Japan was only one of twenty countries he visited, but he became enthralled with flowering cherries and imported a large number of them during the mid-1920s. Ingram's beautiful cultivar 'Okame', a cross between *P. incisa* and *P. campanulata*, received the Styer Award from the Pennsylvania Horticultural Society in 1988 and to my knowledge is the only one of his hybrids widely available in the United States. It is an upright tree with plentiful soft pink flowers that

last up to three weeks beginning in March. The new cherries the National Arboretum is distributing are crosses of *P. incisa* and either 'Okame' or another Collingwood cross, 'Kursar'.

Most people know the cherry trees introduced by David Fairchild. As head of the U.S. Department of Agriculture's Division of Plant Exploration and Introduction, he visited Japan in 1902 and was more excited about the flowering cherries than any other plant he saw. He arranged for a shipment of them to be transported from the Yokohama Nursery in 1905 and planted at his estate in Chevy Chase, Maryland.

Influential visitors were impressed enough to help him obtain more trees to plant at every school in the District of Columbia three years later. Eliza Scidmore, a foreign correspondent who wrote about Japan for the *New York Times* and *National Geographic*, joined him in stirring enthusiasm for the idea of planting flowering cherries along the new "speedway" around the Tidal Basin, and the *Washington Star* threw its editorial weight behind



JESSIE M. HARRIS

A last hurrah from winter always threatens the annual display near the Jefferson Memorial.

A GRAY-FLOWERING CHERRY FROM THE DISTANT PAST

Hajime Watanabe did not know that it was forbidden to bring cherry trees into the United States. All he knew was that first his elderly father and then townspeople in the Japanese village of Neo told him that they wanted to see descendants of the ancient *Usuzumi-no-sakura*—"cherry tree with gray blossoms"—growing in Potomac Park in Washington, D.C.

Legend holds that 1,400 years ago, Keitai Tenno, the twenty-sixth emperor of Japan, lived for eighteen years in Neo, and that when he left, he planted a tree that he named *Usuzumi*—the Japanese word for a light gray Chinese ink. According to Watanabe, it is uncertain whether the word was meant to refer to the fleeting nature of life on earth or to the color of the tree's blossoms, which open white, turn pink, and then, a few days before falling, a light gray.

Japan designated the tree a "Precious Natural Monument" in 1922. Competing trees were removed and its massive branches propped up, but in 1948, after centuries of being pounded by typhoons and crushed under the weight of snow, it was given only three years to live. When a grafting expert found most of its roots nearly dead, he reportedly grafted on nearly 240 roots of young wild cherry trees, and the tree bloomed again the next April.

Cuttings from Usuzumi-no-sakura, reputed to be 1,400 years old, are Japan's latest gift to the U.S. capital's cherry display.



COURTESY OF GEORGE A. WHITE

In 1988, Watanabe contacted American friends, who were told by the National Park Service that what he wanted was almost impossible. But they persevered and officials of the U.S. Department of Agriculture explained the steps they should take: collecting bud cuttings at the appropriate time in January, packing them properly, and then hand-carrying them to the United States, where they would be quarantined and put through a rigorous series of tests for pests and diseases.

Watanabe and a representative of Neo arrived with the first cuttings in January 1990. But the cuttings, packed in a wooden box, were dehydrated, and efforts to graft them failed. A second batch was sent in February 1991; one graft seemed successful but that tree eventually died.

USDA scientists in Beltsville, Maryland, believing that viruses found on the twigs might be complicating the process, sent the remaining cuttings—short, thin, and sparsely budded—to an experiment station in Prosser, Washington, which houses a program for treating viruses.

The station is now growing ten of the *Usuzumi* seedlings, which have been subjected to temperatures of 100 degrees in an effort to rid them of the virus. Cuttings from the treated trees will then be grafted and grown to transplanting size by a nursery, with the goal of planting fifty of them in East Potomac Park in three to four years.

The actual age of the tree has been called into question. But John Creech, former director of the U.S. National Arboretum, notes that unlike Americans, the Japanese do not remove plants that become "overgrown," misshapen, or discolored by disease, but try to preserve them for as long as possible. Although this is reported to be Japan's largest cherry tree, "There are many famous old cherries in Japan," says Creech. "One said to be over 1,800 years old was growing as of 1929 at the Jissoji Temple in Yamanashi province."

George White, plant introduction officer for the USDA's Agricultural Research Service, has visited the site of the parent tree. "When you see the size of its trunk, the large, long branches, and the overall breadth of this marvelous, ancient tree, you become a believer," he says.

—Kathleen Fisher, Editor

the project. When Scidmore took the idea to Helen Taft, the first lady made a formal request to the mayor of Tokyo, and the dream seemed to have become reality.

But the trees the mayor sent were infested with at least three types of insects and as a result, all 2,000 were burned, virtually in the shadow of the Washington Monument. Three years later, 3,000 more cherry trees, raised in near-virgin soil and repeatedly fumigated, were finally planted. The capital city's annual Cherry Blossom Festival was launched in 1935. Today, just as in Japan, thousands stroll beneath the trees each April, celebrating spring while knowing that frost, rain, or wind can make the life of the fragile blossoms even briefer.

While cherry trees have been an important symbol in our national city for most of this century, the number grown in our city gardens is still very limited. Many of them are simply too big for the average-sized landscape. The yoshino cherry (*P. yedoensis*) that plays so prominent a role at the Tidal Basin has a wide spread and needs at least thirty feet of vertical space. The sargent cherry (*P. sargentii*) is unusual in being hardy to Zone 4 and having bright red autumn foliage, but it can grow to fifty feet or more. Even 'Okame', which is relatively small, will grow to thirty feet and spread as wide.

Other than Ingram's efforts, no outstanding flowering cherry hybrids have yet been released outside of Japan. Because of the strict quarantine restrictions, new ornamental cherries for American gardens—including any selections or hybrids of *P. incisa* that reflect its small stature—will have to come from American breeders.

It was to that end that the U.S. National Arboretum's Roland M. Jefferson went to Japan on two collecting trips, for a total of eight months, in 1982 and '83. He was able to import nearly 400,000 seeds from seventy-three species and cultivars and budwood of more than 180 varieties.

Jefferson returned to Asia for another seven months in 1986, making some 100 collections in Taiwan, Japan, and Korea. Thousands of seedlings were grown at the arboretum from this seed collection and were distributed to cooperators throughout the United States.

Before he died in 1990, Donald Egolf began what successor Randy Johnson calls a "brutal" selection process, incorporating the survivors into his ongoing breeding program. Before coming to the arboretum in 1992, Johnson had been working with pines and eucalyptus in Australia. The goal

COURTESY OF JOHN L. CREECH



COURTESY OF JOHN L. CREECH



COURTESY OF RANDY JOHNSON / U.S. NATIONAL ARBORETUM



*Left: The author has named the *P. incisa* selections that he grows 'Fair Elaine' (top) and 'Snow Cloud' (bottom). Above: A test field of cherry selections and hybrids at the U.S. National Arboretum.*

there was clear: the trees needed to be big. Selecting ornamentals is a much more subjective process, he observes.

For example, gardeners who like a large-flowered cherry, like 'Kwanzan', may need time to appreciate *P. incisa*, whose flowers are numerous but small and delicate. And while all of my own *P. incisa* specimens have grown without pruning into single-stemmed shrubs, trees in the arboretum's test field have become multi-stemmed, which might be a drawback for someone who doesn't enjoy pruning as much as I do.

It is delightful to stand near such an intimate small tree, carefully pruning or inspecting its flowering branches. Here in the mountains of western North Carolina, my *P. incisa* selections flower in early April. One, which has upswept branches and pink petals with darker sepals, I call 'Fair Elaine'. Another seedling, with a more open habit and masses of flowers with pure white petals and pink sepals, I call 'Snow Cloud'. It is rare for the flowers of any cherry to stay on the tree for more than two weeks and these bloom as long as any. *P.*

incisa requires full sun, but otherwise is not particular about its culture. Mount Fuji soil is volcanic, but the tree thrives in our heavy clay, mountain soil.

A different person in charge of the arboretum's shrub breeding program will mean a different approach. Egolf was known as a perfectionist. Johnson is more willing to release for evaluation material that may need additional improvement, if he feels it is superior to what is now in the marketplace. He would like to see darker green foliage and more spectacular fall color. But each of the new hybrids—which at twelve to fourteen feet will be a bit taller than the species—offers gardeners something new. The blooms of one, for instance, open white and then turn pink.

P. incisa still needs to be evaluated for hardiness. One grower in the far South reports that the species does not perform well there, although Johnson believes that heat tolerance may be better in the hybrids, since Ingram's *P. incisa* crosses with *P. campanulata* are grown in the South. Judging from its native habitat around Mount

Fuji, I would expect it to succeed as far north as Zone 5. One evaluator of the new arboretum hybrids will be Harold Pellett at the Center for Development of Hardy Landscape Plants on the north edge of Zone 4 in Minnesota. The center specializes in selecting plants that tolerate cold and urban stresses.

Evaluation for disease resistance is probably even more crucial. "I've had some nurserymen say I was wasting my time with *Prunus*, because it's such a sickly tree," says Johnson. But he agrees with me that pushing ornamental cherries closer to perfection is a job well worth doing and that the American gardening public is ready for the little Fuji cherry. "In the past, people wanted what Mom and Dad had—they wanted a yoshino. But now, I think they're willing to experiment."

Dr. John L. Creech is a former director of the U.S. National Arboretum and an editorial advisor to American Horticulturist. His own plant explorations were profiled in the December 1991 issue.

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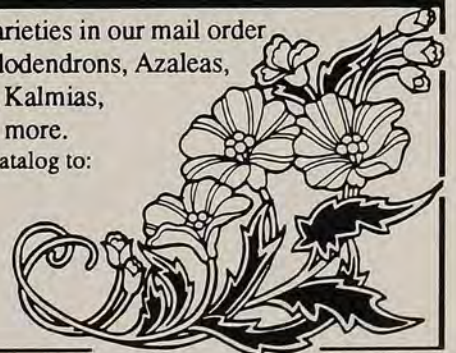
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APRIL 28-MAY 2, 1993 GARDENS OF BARBADOS

This once-in-a-lifetime program, offered in conjunction with the Barbados National Trust, features an exceptional collection of historic homes and gardens where our hosts have invited us for special luncheons and dinners. A dinner reception at "Mallows," home of Paul and Racelle Altman, provides a cordial welcome to Barbados. Mr. Altman is vice president of the Barbados National Trust. We also visit Andromeda Gardens, creation of Iris and John Bannochie. Started in 1964, this garden is acclaimed as the finest botanical garden in the Caribbean, home to thousands of tropical trees, shrubs, and flowers collected by the Bannochies from around the world. AHS Board Member Katy Moss Warner, from Lake Buena Vista, Florida, will be the leader for this tour.

JULY 14-26, 1993 GARDENS OF THE MEDITERRANEAN

A voyage of exploration on board the small ship *Stella Maris* from Nice, France, to Venice, Italy. Ports of call will include Portofino, Elba, Sorrento, Messina, Katakolon, Corfu, and the Termiti Islands.

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

AUGUST 1-19, 1993 GARDENS OF SCANDINAVIA

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

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