

American Horticulturist

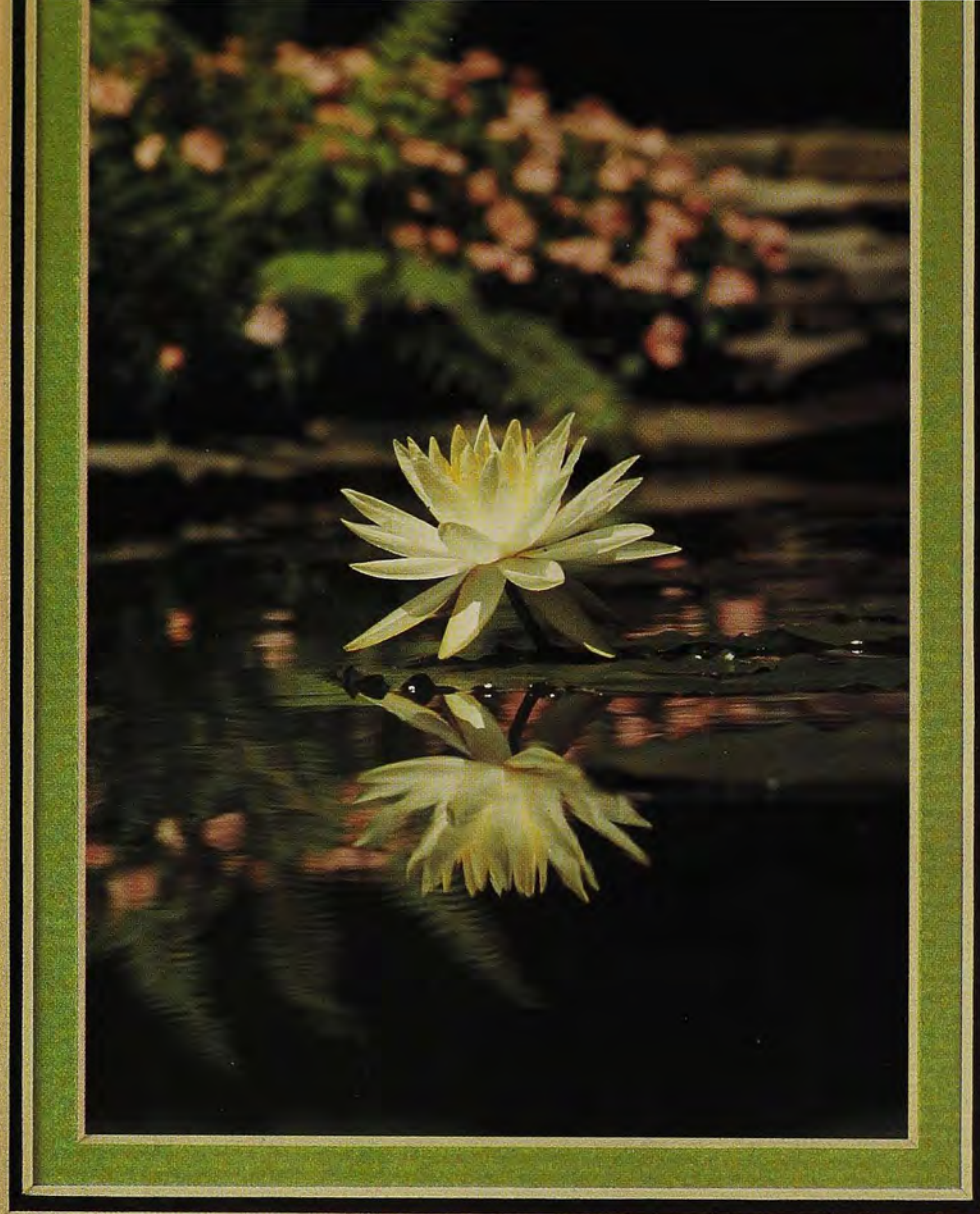
December 1991

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JOHN CREECH, PLANT EXPLORER





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American Horticulturist

Volume 70, Number 12

December 1991

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The state's heat, sand, bugs, and torrential rains can send transplanted gardeners into shock.

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by *Peter Loewer* 16
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by *Kathleen Crawford* 23
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A Variety of Variegates

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Once gardeners try multi-hued foliages, they may be hooked on spots and stripes forever.

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How does variegated foliage get that way? In most cases, a genetic mutation is the cause.

A Tree History: The American Beech

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DECEMBER'S COVER

Photographed by *Stephen G. Pategas*

The widely available *Caladium* 'Freida Hemple' is lower growing than most fancy-leaved caladiums. Such cold-sensitive bulbs grow magnificently in Florida, where many garden favorites languish or die. Beginning on page 10, Becky Wern describes the lessons learned in moving from eastern Pennsylvania to Jacksonville, Florida. Starting on page 26, Elisabeth Sheldon describes her favorite variegated-foilage plants and suggests that those who seek serenity in the garden may want to choose some less flamboyant color combinations.

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COMMENTARY

The contemporary American landscape continues to undergo rapid change. Post-war era suburbs, medium-sized regional cities, and both of their extended communities, mushroom and connect. The major cities, and the regions of power that birthed them, decline in importance. We are thinning and spreading as a population, getting away from the close proximity to one another that has characterized our experience in the cities and towns of the last several generations, and in the old nations of Europe, Africa, and Asia. This process is not new; what is different now is the rate of change, resulting from the automobile and electronic communication. We no longer perceive growth to be “natural” in the old sense of nature as a nonhuman force: gradual, careful, logical, ideal. Of course, it has rarely been thus, and is even less so now. Today our growth is convulsive, drastic, automatic, and beyond normal comprehension. We react by getting away from it. And with the global village comes the “global garden.”



The psychological effect of being crowded together, and through television and other media subjected to idealized images of ourselves, is to create a collective narcissistic fantasy world that alienates us from nature, and from each other. The effect of spreading ourselves out and decentralizing the global village will be very positive, a true return to Eden. One of the key elements of the new landscape is the new garden, and the “nongardening” use of plants. As we free ourselves from the notion of population centers, we will experiment with new ways of looking at ourselves, our gardens, and our landscapes. Our gardens will redefine the boundaries and traditions of the past. Already we are creating and recreating gardens in new spaces and under resource-scarce conditions in many parts of North America. And as we become less crowded, we become less media-driven, and return to our cultural and spiritual roots. The home and garden—the personal spaces—will be where much of the significant psychological change will occur and become manifest. Time will slow down. We will return, if only for a few moments a day, to the rhythms of the sun and moon.

The transformation of the North American landscape is a central concern of our Society. No matter how closely we connect our ideas and values, our gardening challenges will remain individual and unique. Through our Gardeners’ Information Service, we answer your questions about gardening problems and advise you of horticultural activities in your area. Our education and internship programs help new gardeners and aspiring professionals learn fundamental skills and refine existing ones. We focus on issues that affect both of these groups in our symposia and lectures. And in our monthly publications, we track developments in our private and public gardens, and planted landscapes throughout the continent. We are committed to helping members identify, understand, and enjoy these changes.

Thank you for your support this past year. On behalf of the staff, and the officers and members of the Board of Directors of the Society, I wish you happiness for the holidays and bright prospects for the new year.

George C. Ball Jr., President, AHS

LETTERS

A Special Tree

The October article by Susan Sand on the Osage orange was such a nicely written and informative article on one of the lesser-known trees. Unlike trees such as beech, oak, and chestnut, which are all in the beech family; or pecan, walnut, and hickory, which are all in the walnut family, the Osage orange has no close relatives, and as far as I know is disease resistant. Its only enemy is man. It was interesting to learn about the insect-repelling properties.

The French term for the tree, *bois d'arc*, has been degraded in American usage to "bodock." Another common name is "horseapple." In addition to being prized in its use for fence posts, the extremely dense and yellow-colored wood has been used for making specialty duck calls . . . specialty usages for a special tree.

Jerald M. Duncan, M.D.
Memphis, Tennessee

Wrong *Ratibida*

My botany instructor warned that poor identifications are often made from photos. Still, with neck stuck far out, I'll say that the *Ratibida* on page 14 of the October issue surely does look like *R. columnifera* rather than *R. pinnata*.

Ron Carrow
Omaha, Nebraska

Your neck is safe. We asked the staff of Morton Arboretum's Education Department about the identification of the Ratibida, and while they agreed with you that it's risky to identify plants from photographs, they said they were quite certain the flower was indeed that of R. columnifera. The primary difference between the two is that in R. columnifera, the disc flowers are as long or longer than the ray flowers; in R. pinnata, they are shorter. Told that the plant had been identified as R. pinnata at a major public garden, Morton's Craig Johnson did not seem surprised. It's especially important when establishing a prairie garden, he said, to "know your seed sources."

Rhododendron Resource

Spring and summer being rather busy, I have just gotten around to the April edition. It was with great delight that I discovered the photo of an old friend, Dr. Henry Schroeder, in the article by Erin Hynes ("The Quest for Cold-Hardier Azaleas"). I had the pleasure of meeting Roland, the name by which he was introduced, in the early '80s when he joined our group inspecting *Rhododendron occidentale* in northern California. Roland was well known at that time in rhododendron circles for his extensive work in breeding for cold hardiness and I was honored when he visited my garden a year or two later. It was a real tragedy when his work was cut short by his death.

The rest of the article read like a "Who's Who" of people very active in the American Rhododendron Society (ARS). It was with great surprise, then, that I read the "Sources & Resources" at the end of the article. The ARS was not listed! August Kehr is a past president, as is Fred Galle. Mary Beasley is currently director for District 10. Attendees at the 1990 national convention visited Weston Nursery and were greeted by the Mezitts and Christopher Rogers. Weldon Delp is active in the society as are many of the others mentioned in the article. And of course, so was Dr. Schroeder. In 1982 he contributed 270 different seed lots to the ARS Seed Exchange. He contributed similar numbers in 1983 and 1984 and his sons contributed the fruits of his labors after his death in 1985.

The ARS is a real resource for anyone interested in growing better rhododendrons and azaleas. At only \$25 a year, it is a real bargain. Its journal is well worth the price. Its Seed Exchange last year listed some 2,000 seed lots of both species and hybrids; seeds include not only rhododendrons, but evergreen and deciduous azaleas. Contributions by many of the people consulted in the article have been listed over the years. As Fred Galle so aptly notes, "dedicated amateur azalea enthusiasts are assuming a larger role in

hybridizing," and many of these amateurs are receiving encouragement from the ARS. As noted by several in the article, there are many pitfalls along the way, but what can compare with the joy of seeing for the first time "4,000 plants bloom that no one on earth has ever seen before"?

I would encourage everyone interested in growing the myriad forms of rhododendrons and azaleas to contact the ARS. There are chapters all over the United States as well as in Canada, Denmark, and Scotland. For more information write: Barbara Hall, Executive Director, P.O. Box 1380, Gloucester, VA 23061.

Dick Cavender
Director, District 4
American Rhododendron Society

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BOOK REVIEWS

Gardens of the World: The Art and Practice of Gardening

Consulting Editors Penelope Hobhouse and Elvin McDonald. Forward by Audrey Hepburn. Macmillan Publishing Company, New York, 1991. 262 pages. Color photographs. Publisher's price, hardcover: \$39.95. AHS member price: \$34.00.

This sleek, expensively made publication is essentially an elegant book tour, conducted by eight distinguished garden authors, active horticulturists, and photographers whose combined credits are awesome. Actress Audrey Hepburn, who filmed a PBS special in fifteen of the more than sixty gardens featured, explains that they were carefully selected "to illustrate a particular aesthetic, practice, or concept."

Editors McDonald and Hobhouse take the first two, "Roses and Rose Gardens" and "Formal Gardens." They are followed by "Tulips and Spring Bulbs" by Allen Paterson; "Japanese Gardens—An Accretionary Approach" by Teiji Itoh; Ann Lovejoy's "Flowers and Flower Gardens"; "Tropical Gardens" by Katherine Whiteside; "Country Gardens" by John Brookes; and "Public Gardens" by Madison Cox.

Hobhouse offers a fine summary of formality, from pre-Christian to Moorish to

the great Italian and French Renaissance gardens to the English naturalistic style. Of necessity, many familiar gardens preside here, some even repeated in the different chapters, but there are welcome newcomers as well, such as the magnificent landscape of Upton House in Warwickshire and Mount Stewart in Northern Ireland. The underlying thread of continuity in this book is beauty, so we may and should look again and again at what we have known. Some readers may never leave the roses of Malmaison, Mottisfont Abbey, and La Rosaraie de Bagatelle, with all of its wondrous teas, damasks, and bourbons, until they have worn the chapter to tatters.

For a treat to fire your imagination, there are the wild tulips, once "an unremarkable article of food," blooming spectacularly on the Old Silk Road south of Samarkand, opening to the size of dinner plates, the seaside landscapes of the Sumiyoshi coast, and the raked gravel waves at Ginkaku-ji, "most beautiful in the moonlight."

Brookes's chapter on country gardens is full of intriguing ideas for the home gardener; not the least of which is simplicity and reduction of labor intensity.

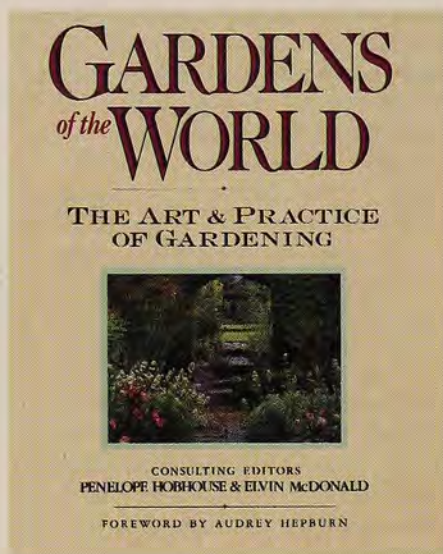
Our tour concludes with public gardens, which supply the urban dweller's basic need for green vistas, flowers and shrubs, water, and winding paths. Cox gives us the stunning parks of Paris, Washington, New York, and others, and then sums up the concern brought forth by all the contributors:

"As the world's natural environments have come under direct threat of destruction and concerns for the earth's safety become more complex, we must continue to an even greater degree, to maintain and protect both the natural world and the one we have created, as the two are vital to our existence."

He has the last word, which must remain first in our minds, now and in the future.

—Faith Jackson

Faith Jackson, former book editor of the Miami Herald, is a Master Gardener who writes frequently about garden matters.



HOME ORCHID GROWING



REBECCA TYSON NORTHERN

Home Orchid Growing

Rebecca Northern. Prentice Hall Press, New York, 1990. Fourth edition. 376 pages. Color and black-and-white photographs and drawings. Publisher's price, hardcover: \$45.00. AHS member price: \$38.25.

Orchids: An Illustrated Identifier and Guide to Cultivation

Mike Tibbs and Ray Bilton. Apple Press, London, 1990. 96 pages. Color photographs. Publisher's price, hardcover: \$10.00. AHS member price: \$8.50.

Rebecca Northern's fourth edition of *Home Orchid Growing*, first published forty years ago, retains its status as "the orchid growers' Bible," in recognition of its value to generations of orchid growers as a reference of the highest caliber. The fundamentals for beginners are here, along with more specialized information for the experienced grower.

The logical organization of the book reflects Northern's understanding of her subject. To succeed in growing orchids, she says, "one must consider how they grow in nature and learn their basic needs." The first chapters present orchids as a hobby, a brief history of orchid growing, and habitats where these plants are found. Basic growth habits and flower structure follow, with explanations of orchid terminology.

"Since cattleyas are the most widely grown of all orchids, . . . the conditions that suit cattleyas and their method of culture have become . . . a point of departure." Although four chapters are devoted to cattleyas, the culture and techniques described lay a foundation that can be adapted to grow any orchid once the concepts are understood.

Ten chapters then introduce 650 plants,

chosen from the 30,000 species and countless hybrids that distinguish orchids as the largest family in the plant kingdom. An excellent chapter examines problems, pests, and diseases. Another discusses interior and exterior locations suitable for housing an orchid collection. A comprehensive appendix of orchid literature is included.

The strength of this book is its attention to detail, which encourages the reader to develop the observational skills necessary to grow better plants. Northern is an orchid grower's best friend. She will surely add new followers with this volume.

Those who've mastered the basics will be hard pressed to find another volume as useful as Northern's but beginners may find the size and scope of this book daunting. Another book, *Orchids: An Illustrated Identifier and Guide to Cultivation*, provides just the limited focus a beginners' book should have, with many splendid color photographs.

Mike Tibbs and Ray Bilton, well-known commercial orchid growers in England, focus clearly on basic information and the easiest orchids to grow. In a volume beginners will find both readable and informative, the authors have drawn upon their knowledge and experience to craft a tidy book that quickly draws the reader into the world of orchids.

The authors state: "While this book in no way attempts to be a definitive work on orchids, we have tried to break down some of the fallacies associated with their cultivation . . . in a simple fashion, so that the reader will know what type of environment and climatic conditions need to be provided for specific genera." And that is just what they have done.

Three sections are outstanding. Limiting themselves to specific coverage of six popular orchids and their related hybrids (*Cymbidium*, *Odontoglossum*, *Paphiopedilum*, *Cattleya*, *Miltonia*, *Phalaenopsis*), the authors clearly describe cultural needs in terms even the most timid beginner will understand. Six culture charts follow, listing changing cultural needs dictated by changing seasons. Finally, their "Orchid Identifier" photographs illustrate the beauty and variety found in the species and hybrids of these orchids.

However, while beginners are well served by the information in this book, readers with more experience might wish the focus were broader.

—Phyllis Finkelstein

Phyllis Finkelstein is an interior plant-scaper in Scarsdale, New York, who has been growing orchids for twenty years.

Heliconia, An Identification Guide

Fred Berry and W. John Kress. Smithsonian Institution Press, Washington, D.C., 1991. 334 pages. Color photographs. Publisher's price, hardcover: \$35.00; softcover: \$16.95. AHS member price, hardcover: \$30.00; softcover: \$14.40.

Nature lovers have a large number of field guides to assist in the identification of fauna and flora. Most are written for a particular geographic area, usually in the temperate regions. Like these field guides, Berry and Kress's *Heliconia, An Identification Guide* provides nearly everything a heliconiophile would want to know in order to identify a heliconia along the path.

There are more than 200 species of heliconia, and many horticultural forms are making their way through the flower markets and into interiorscapes and tropical landscapes. About half are included in this book. For those who venture off the main roads of the tropical Americas and Caribbean islands, the guide will be valuable, but its coverage is more complete for the species that have been brought back into cultivation.

Several preliminary chapters cover the basic botany and natural history of heliconia. The background essential to naming and taxonomy is provided without reference to the nitty-gritty of botanical detail; for this there is included a glossary of terms. An index is also included, and it is necessary, as the species are not arranged alphabetically within the guide. In the index, it would have been helpful to have indicated the pages on which color plates appear, as many species are cited in several places in the book.

The glory of *Heliconia* lies in its over 200 color plates with supporting descriptions of the inflorescence, plant habit, geographic distribution, habitat, and blooming time. The photographs are excellent, and the color reproduction is for the most part very close to the real thing.

Horticulturists have developed a number of cultivars from the main species of heliconias. Some of these have been described in a taxonomic notes chapter, which represents an important effort to record and assign cultivar names and synonyms—a difficult task given the many areas of commercial production. The authors have also provided lists that correct mislabeled photographs and outdated nomenclature for heliconias in *Hortus Third*, the *Royal Horticultural Society Dictionary of Gardening*, *Exotica*, and *Tropica* (second edition).

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Although the guide is meant primarily for identification, the gardener and grower are not neglected. Three appendix chapters provide guidance to cultivation and use of heliconias in ornamental design. While temperate zone gardeners may be jealous because they are unable to cultivate heliconias outdoors as their southern (Zones 10 and 11) counterparts do, those with their own greenhouses may find this book useful in meeting the challenge of protected culture of these brilliant tropical flowers.

—Richard A. Criley

Dr. Richard A. Criley is a professor of horticulture at the University of Hawaii at Manoa.

French Dirt

Richard Goodman. Algonquin Books of Chapel Hill, Chapel Hill, North Carolina, 1991. 203 pages. Publisher's price, hardcover: \$16.95. AHS member price: \$14.40.

This is not the usual gardening book. It's about how a garden in Provence brought a member of the cool generation out of the cold, and it's well worth reading.

Prompted by Iggy, a valiant, iron-willed Dutch girlfriend, author Richard Goodman rented, sight unseen, an inexpensive house in Provence for a year. He's forty-something, a New Yorker. One of a cluster, the old stone house fronts on a country road that meanders past small vineyards and wooded hills. This hamlet—St. Sébastien de Caisson (an alias)—must be the only ungentrified place left in France's trendiest region, for it has no divine restaurants, no cute cafés, not even a bar or bake shop. Here Richard and Iggy find neither romance, à la Fitzgerald, nor amusing natives and exquisite food, à la Peter Mayle (*A Year in Provence*). Endurance and physical courage are the measure of the men and women, and the land is something like their soul.

Richard is an apprentice of fast, hard cities, and trendy professions. This region, where nature is so vibrant I swear it can wake the dead, pierces Richard with a sense of alienation. The forbidding silence of the streets—shattered every evening by hard rock when the farm boys congregate in their pickup trucks—reflects Richard's inner landscape. He conceives of a garden as a way into the lives of the villagers, and a means of hoarding his dwindling dollars.

How Richard earns the land, harrows and rakes it, plants, cultivates, waters, by the sweat of his brow and under the burning southern sun, is passionately told. In

these chapters he evokes in the reader the feeling of that single-minded determination we lose with childhood—the gift that pushes your bike to the top of an impossible hill, for instance. Fat tomatoes, basil, and purple eggplants heaped on the kitchen table, and the joy to be had in driving your body are the smaller parts of Richard's harvest. The richer portion is a return to the feeling for land he had as a boy growing up in Virginia and Michigan.

Provence is like that. I lived with peasants in the hills behind Cannes for a couple of years. And I came to think that we should not be allowed to move to big cities until we have planted and harvested food and flowers, and found our roots.

In *Winter Sunshine*, the great nineteenth-century travel writer John Burroughs wrote, "I shall probably describe more myself than the objects I look upon." *French Dirt* is about self-discovery, a voyage gardens map out for those they entice.

—Jacqueline Heriteau

Jacqueline Heriteau is the author of The National Arboretum Book of Outstanding Garden Plants.

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STEPHEN G. PATEGAS

Above: Florida's unpredictable winter weather is one of its greatest gardening challenges. An irrigation system left on overnight turned this Ligustrum sinense 'Variegata' to an ice sculpture. This is often done deliberately; the freezing of water creates a protective heat. Inset right: Subtropical plants like Hibiscus 'The Path' are right at home in Florida gardens.

FLORIDA FOLLIES

For newcomers to this state, costly mistakes are almost a rite of passage.

B Y B E C K Y W E R N

If you come to Florida from a place with gray skies, you may feel you have arrived in paradise: skies are blue, the air is warm and moist, palms and other plants bloom even in January. Each year forty-one million people visit Florida and each month a thousand people move here. What they see appears to be a horticultural wonderland.

Those who stay may be surprised.

When I moved to Jacksonville from eastern Pennsylvania, I was at first convinced I was in Nirvana. But then I began to be unnerved just looking around my yard. Some of these plants are so . . . different. Pointy holly leaves were recognizable and so were pine needles, but plants like pittosporum



ELVIN MCDONALD



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Top: Sheet-covered plants create a ghostly landscape, but the covering will protect them from an overnight freeze. Left: The multitude of insects can be horrifying. Here, walnut caterpillars munch on an azalea. Above: Among pests, snails are considered relatively beneficial because they help break down scarce organic matter. Here, one samples ginger.

and ligustrum were not. Consulting my pile of gardening books was no help; plants specific to only a small portion of the country don't merit a mention in homeowner landscape encyclopedias. When do you prune it? When do you fertilize it? And what's this unhealthy looking white stuff on the back of the leaves? And this grass—it's thick and uncomfortable to step on barefoot because it's laced with hard runners. Your lawn mower labors through it and it needs to be cut about every five days, seven months of the year. At no time can you put the mower away for as long as a month. You can't even see the dirt through the runners. If you could, you'd discover that this "soil" is just sand.

Eventually, gardeners dig into that soil, which is made up of five different types of sand (based on color and grain size) along

with some clay. They find that it's easier to dig than "real" soil, because it's devoid of organic matter. This doesn't make sense: with all this lush tropical growth around, there is also death and decay; where is all that inevitable decaying matter going? The fact is, you've got to *have* organic matter to *hold* organic matter. Without it, all the nutrients from shed leaves and needles, as well as our mulches and fertilizers, leach away with every rainfall. And since Florida gets an astounding forty to fifty inches of rainfall per year—mostly between June and October—the leaching problem is enormous.

Organic matter is a veritable pantry, storing nutrients and water until plants can take them up. But if nature is going to keep leaching it away, the gardener needs to keep a continuing stream of compost going

into the soil. It can be worked into the soil when plants are added or moved. It should be covered with a three-inch layer of mulch, which will need to be replaced about once a year. Even if all this organic matter is added, granular fertilizers must be applied to annuals, perennials, and vegetables every four weeks.

In areas of white sand, which retains no water, it may be necessary to spread a half-inch layer of composted cow manure over grass once a year. Once it's watered in, the cow manure will be washed down around the roots and runners, where it will hold water and fertilizer. This may sound like a lot, but remember, this is not a fine-textured zoysia. This is St. Augustine, with leaf blades up to almost a half-inch wide and able to dull mower blades in two cuttings. The runners alone can be nearly a quarter-inch thick! And this grass is growing up to two inches per week. Without the cow manure, the grass must be watered daily (no longer possible in our water-stressed state) or it will die out.

There is a long list of much-loved plants that simply will not grow here—from daffodils and lilacs to astilbe and tuberous begonias. Although common throughout most of the country, these plants simply cannot tolerate the five or six months of intense heat or, in some cases, the lack of a consistent cold-dormant period. Most of the time, catalogs correctly identify these plants as viable only as far south as USDA Zone 8. Plants said to be hardy through Zone 9 can present a problem. Zone 9 covers the northern half of Florida and much of California, two areas that have in common only their minimum low temperatures. Inappropriate humidity and rainfall levels, too-high day temperatures and high nighttime lows can be as deadly to plants as a freeze.

None of this dulls the determined gardener. This is how I have killed three sets of lily-of-the-valley pips, two *Carex morrowii* (a lovely ornamental sedge, according to the pictures in the catalog), and a couple of hostas. My *Dianthus* survive every year until the middle of September. If they lasted two more weeks, the cooler nights would revive them. I have explained this to each year's plants, to no avail. This year I collected seeds from a friend's enviable garden in Massachusetts: globe thistle (*Echinops ritro*), Zones 3-8. You never know; they might work. And I'm borrowing room in a neighbor's refrigerator to prechill some tulips. Having done this

before, I know they'll only bloom once, but there are a lot of former Yankees in my neighborhood. They'll understand.

Part of Florida's gardening challenge is the absolute unpredictability of the winter weather. In the last eight years, north Florida has had two or three Christmases in the high 70s, one Christmas with a low of 13 and a high wind, and one Christmas when everything was coated with one-half inch of ice. Tropical plants can't withstand that cold; temperate plants can't withstand unrelenting summer heat. This makes most plant catalogs—and yes, magazines—occasionally painful to read. Gardeners have a tendency to try to bring the gardens they've known before to new locations, to make it seem like "home." I can testify that planting "Pennsylvania" in Florida is not fiscally sound.

The only sensible way to deal with a new climate is to concentrate on what you can grow. Yes, orchids grow outside here (although you have to bring them in during cold weather). Many subtropicals grow wonderfully in Florida: hibiscus, allamanda, poinsettia, croton, crown-of-thorns, ixora, camellias. Aloe, citrus, elephant's-ear (*Alocasia* spp.), and ficus can be grown outside. For the most cold sensitive of these plants, south Florida offers some safety; in other portions of the state some form of cold weather protection is necessary—even temperatures in the 40s cause permanent damage to most tropical leaves.

One of the most difficult adjustments is the complete realignment of the mental calendar we all plant and harvest by. Tomatoes go into the garden in March or April in other parts of the country and come out at the first frost. Here they go into the ground in March and stop bearing in June when the high night temperatures prevent fruit setting. You won't want to plant 'Beefsteak' or 'Big Boy' tomatoes, however. 'Flora-Dade' and 'Floradel' will be more resistant to insects and diseases. Most "summer" vegetables follow similar schedule and variety changes. A second crop can be planted in the fall and with luck will be finished before frost hits. South Floridians can grow vegetables through the winter although as we've seen several times in the last ten years, a cold snap can wipe out the crop.

The same is true of ornamental annuals. Pansies and petunias, sweet peas, pinks, and annual poppies can be planted in October. This doesn't mean they'll be blooming in December—some annuals depend



ELVIN McDONALD



ANN REILLY, PHOTONATS

Top left: Flowering trees help make Florida seem a horticultural wonderland. *Tabebuia argentea* is native to Paraguay and Argentina. Bottom left: Japanese hibiscus (*Hibiscus schizopetalus*). Below: Floridians can grow *Freesia* 'Ballerina' outside.



ROBERT E. LYONS, PHOTONATS

upon increasing day length to trigger blooming. They will spend the "winter" growing roots in the warm soil and begin flowering in January or February. The main color season is late winter through May. Many cultivars require too long to mature to flowering size and they fade away in June's heat without blooming. Only the quickest-blooming varieties will do. Flowers listed in plant catalogs as blooming through the summer are finished by June, when they are replaced by the less varied but heat-resistant annuals: celosia, torenia, vinca, impatiens. Plants can't escape the heat. Careful plant selection and spacing are essential. Because Florida is so flat, when rains have been heavy water may be standing only two or three inches below ground level. Raised beds allow some sensitive plants or bulbs like lilies that must be

planted deeply to survive the high soil moisture levels.

There are many cold-sensitive bulbs that grow magnificently in Florida. What Northern gardener wouldn't love to grow clivia, alstroemeria, caladium, and freesia in the ground? A nice stand of amaryllis bulbs in full bloom is a lush sight.

The most sensible landscaping approach is the use of native or naturalized plants. Using the most reliable (and least invasive) of the shrubs, trees, and vines can create a contrast of color and texture. Large yard areas can be set aside for these woodland-style layers of azaleas, viburnum, ferns, and not-so-native junipers under a canopy of oaks and pines. Rudbeckia, gaillardia, and lantana naturalize beautifully here as they do in many areas of the country. A layer of mulch helps minimize weeds. Such

LESSONS FROM THE MAGIC KINGDOM

Recent transplants to central Florida, like gardeners elsewhere, can seek advice from their county's Cooperative Extension Service on such things as plant varieties and proven ways to forestall insects and diseases. But while Florida is not among the states with the most severe cutbacks in funding for this government agency (see the October *American Horticulturist*), there is currently a hiring freeze that has left counties without agents or sufficient support staff. There is no longer money in the budget for the fact sheets that they used to give to homeowners.

An alternative source of information, and certainly of inspiration, is the Walt Disney World Resort Complex. As a commercial garden, it is the largest in Florida with 6,600 developed acres. And the vast, meticulously groomed landscape—each year, 2.5 million bedding plants are set out—fairly staggers the imagination. But its staff also deserves high marks for research and education.

Throughout the Disney resort complex, most plants are labeled with both botanical and common names. This is no minor accomplishment given the number and variety of trees, shrubs, perennials, and annuals involved. A single bed may contain over 200 plants; even the turf grasses are labeled. Visitors to the EPCOT Center are welcome to ask questions on any topic through the Outreach Program. They can obtain a wide range of information through the program's computers; other questions are answered by the research librarians who are on duty whenever the complex is open.

Disney also offers several levels of seminars.

The most basic is the one-hour backstage tour of that section of EPCOT called The Land, where visitors see demonstrations of various aspects of agriculture and horticulture, ranging from interplanting and drip irrigation to tissue culture and fish farming. This special Harvest Tour is led by a member of the staff with a degree in a horticultural or related specialty.

For children, there are several one-day seminars, one of which takes them on an ecological learning experience through Discovery Island, EPCOT's The Living Seas, and the 7,500-

acre conservation area. Participants in this minicourse, called "Exploring Nature: A True Life Adventure," take home a workbook of exercises intended to reinforce what they've learned and to help them compare the environments of their home and that of central Florida.

"Gardens of the World," a three-and-a-half hour walking tour of the landscapes in EPCOT Center's World Showcase, is an adult seminar covering design concepts, garden techniques, and residential landscaping. A great deal of horticultural artistry has been involved in shaping each of the eleven "country" landscapes to mirror native lands very different from those of the Florida climate. Landscaping strategies that participants learn include using the same plant species for two different types of landscaping, e.g., the same palms used formally in the Communicore high-tech demonstration area are used to give a junglelike effect in the Mexico Pavilion. Participants in this program tend to come from all around the world, so the variety of questions posed and experiences shared make it a fascinating trip.

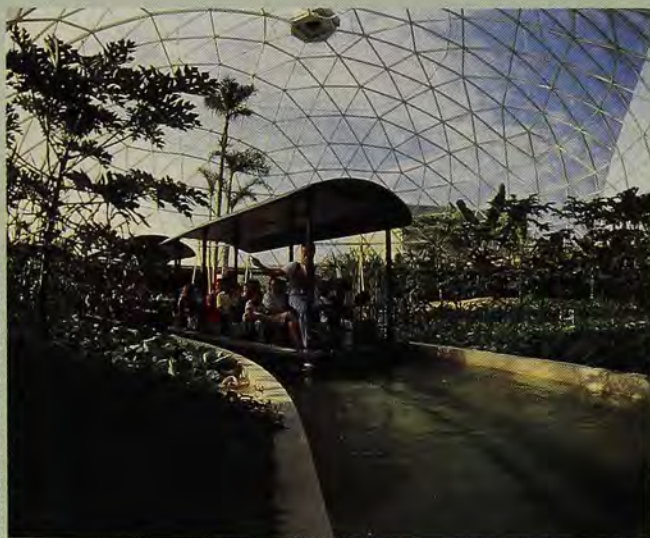
In addition to these opportunities, in which individual Disney visitors can participate, there are two types of seminars for organized groups.

The half-day "Planting Idea" class allows the group—usually a horticulture or landscaping class, garden club, plant society, or trade organization—to select the focus, which can be anything from trees to Integrated Pest Management. A popular choice, "Color Magic," cosponsored yearly by the Florida Nurserymen and Growers Association, focuses on bedding plants.

For professional nurserymen and landscapers, Disney offers a very intensive three-day "Landscape Magic" class that includes horticultural techniques, business management, Integrated Pest Management, and water management.

While the heavy reliance on bedding plants, rather than native plants, seems out of sync with what is currently considered environment-conscious gardening, the Disney horticulture staff appears very concerned with reducing water and chemical use. Because the Disney staff considers horticulture an important part of their guests' experience, they conduct relevant research, for example, on the precise amount and timing of fertilizer for an individual species of banana or boxwood. (If you have a few million plants, the cost and environmental impact of using excess fertilizer is enormous.) Ongoing experimentation with water reuse, tree-salvaging techniques, and composting with sludge has brought the Disney organization praise, even from the most skeptical of environmentalists. The Disney horticulture staff also maintains a year-round trial garden in which they test new annuals for their suitability for the quirky Florida climate, and they publicize the results. And of course they employ the strategy most important in Florida gardening—careful plant selection and careful choice of planting time—to reduce the need for chemicals and irrigation. They use environmentally sound pest measures such as horticultural oils and insecticidal soaps, and biological controls such as predator mites and nematodes.

Certainly, Walt Disney World Resort Complex is primarily a place of entertainment. But the fact that they have a staff of more than 500 people dedicated to the belief that beautiful gardens are important, and to bringing that concept into the environmental '90s, is a bonus for Florida. —Becky Wern



COURTESY OF THE WALT DISNEY COMPANY

Participants in a backstage tour through The Land at EPCOT Center travel by boat through an experimental greenhouse and four ecological areas.

minimum-care, minimum-impact landscapes, with regional variations, work well throughout Florida. As water problems and environmental concerns grow, they are increasingly popular.

Relandscaping is often made necessary because things grow so rapidly here. Trees can grow up to three feet taller in one year and some shrubs must grow twice that. The frequent result—even with pruning—is plants that have outgrown the house and must be removed. Unless you're prepared to prune about five inches off a tiny viburnum up to nine times a year (yes, that's forty-five inches of trimmings), it's going to be over six feet tall in three years. Vines will come through screens on the porch and vigorously growing plants have even been known to insinuate themselves under concrete slabs and into the house. While much of the country searches for rapidly growing cultivars, Florida is interested in plants that hardly seem to grow.

Unfortunately, we don't yet have good, socially acceptable alternatives to turf grasses. Those lucky enough to have a large stand of trees may succeed with shade-loving ground covers or an even barer woodland look. Some homeowners have opted for green-painted concrete. The wet heat in Florida causes short decorative grass mixes to flounder. We use several hardy turf grasses. St. Augustine, one of the most popular, reminds many people of crabgrass. And of course, grasses come with environmental pluses and minuses. In Florida, fertilizer recommendations from the Extension Service have been reduced dramatically and there is ongoing work to find biological controls for our voracious turf pests. Interestingly, the reduced fertilizer seems to make the grass less attractive to insects and less susceptible to diseases.

With all the rain here, fungi can seem to dance from victim to victim. Certainly, we have an abundance of leaf spots and *Botrytis*, *Rhizoctonia* and *Cercospora*. Lawn grasses, annuals, and perennials are the most common casualties. In wet weather, small annuals fold into the ground with rot. Since most gardeners are not going to eliminate all of these susceptible plants, fungicides are necessary.

It would be environmentally unsound to spray preventatively for all of these diseases, as was once the custom. Not only does each fungus respond best to a different fungicide, but fungicides are short lived and are harmful to birds. Currently, the



Florida gardeners can use a variety of reliable, noninvasive ground covers, shrubs, and trees to create low-maintenance landscapes. Water shortages and other environmental problems are making this approach more popular.

only preventative spraying being recommended is for roses, which rapidly become leafless here from black spot. Fungal diseases are very difficult to stop, so careful planting and care are important. Raised beds help prevent fungus problems, as do drip irrigation and watering only in the morning.

From time to time, people predict that insects will someday replace man as the dominant species. If that should prove true, they're using Florida as their starting point. High temperatures allow the insects to reproduce rapidly and for most of the year. The first year, I think, a gardener just recoils in horror. Leafminers seemed to decorate leaves in Pennsylvania. Here they skeletonize, leaving behind just the leaf margins and destroying the leaf's ability to photosynthesize. Grasshoppers can strip a young tree of leaves in a matter of hours. Caterpillars, some as small as a rice grain, can come equipped with a wallop of a sting. People exhibit varying allergic reactions to these stings, but even a mosquito-bite-sized lump is enough to make you think twice about pruning the azaleas. Spider mites seem a minor annoyance under plant leaves one day and have spun webs big enough to use as bridge supports the next. Scale marches up and down stems like horticultural chicken pox.

After being astounded, the gardener starts looking for pesticides. Companion planting and some of the gentler organic methods have been extensively tested and found to be ineffective here. Perhaps this is because of the insects' sheer numbers. But insects don't just damage leaves and fruit. They spread diseases, including deadly and

incurable plant viruses and bacterial infections. If you ignore insects in Florida, you do so at the risk of your landscape, as well as your neighbors'. A Florida gardener's best weapon is any gardener's best weapon: vigilance. Aphids and spider mites can be deterred with soap sprays if they are started early and reapplied every few days. Worm-type pests can be controlled with *Bacillus thuringiensis*, which paralyzes their stomachs. Horticultural oils are a great way to smother insects, but may burn plants if applied during a period when temperatures will be above 80 degrees, which is most of the growing season! When these methods don't work, pesticides are required. Grasshoppers will grow to four inches long. Once that size, pesticides won't even slow them down.

All areas of the country have their gardening disadvantages. Gardeners in the West wish they had water. Gardeners in the Northeast wish they had fewer rocks and less clay. Midwest gardeners get lots of heat and cold and swarms of insects. Florida gardeners face heat, brief but plant-damaging cold, humidity, insects, and frequent drenching rains. In spite of this, they can have beautiful landscapes, fruits, and flowers, without destroying the delicate Florida ecosystem. Like gardening anywhere, it takes a willingness to learn new plants and methods, and to work. It's part of life's lesson to teach us to bloom where we're planted.

Becky Wern is a free-lance writer who has been gardening in Florida for nine and a half years. After eight years as a Master Gardener, she's still asking questions.

Bringing
Back *Asia's*
Best

This plant hunter imported countless desirable ornamentals. But that's only the first step.

B Y P E T E R L O E W E R

No one, except perhaps for Groucho Marx in his “Animal Crackers” role of Captain Spaulding, can match John Creech for making the role of explorer sound like fun. Both Spaulding and Creech are always engaging, and both make you want to pop a *sola topi* on your head and march off to explore far corners of the globe. But Spaulding hunted animals in his pajamas, and Creech is a plant hunter, extraordinaire.

Many times during his expeditions to Asia and the Soviet Union, Creech didn't know whether the next few steps would lead him to an exotic plant never seen by another North American or a nasty tumble off a cliff. Even when he felt exhausted or discouraged, Creech says, “I always had to see what was growing on the other side of the hill.”

Born in Woonsocket, Rhode Island, on January 17, 1920, Dr. John Lewis Creech now lives just outside Hendersonville, North Carolina, surrounded by a garden full of the plants he gathered from around the world during his forty-four-year career.

During those years he was a horticulturist with the U.S. Department of Agriculture, the leader of nine major plant explorations, the director of the U.S. National Arboretum, and the interim director of the brand new North Carolina Arboretum. He still serves as a senior advisor to that arboretum, as well as to the International Board for Plant Genetic Resources, a group that



JOHN CREECH

Above: The fall-blooming Hemerocallis littorea is one of John Creech's favorite plants, but it hasn't made a splash in the gardening world.

Right: Creech studies Ilex rugosa during a 1961 plant hunting expedition to Hokkaido, Japan.



THE CASE OF THE DISAPPEARING FIG

The often unpredictable fate of deserving, foreign-collected plants was illustrated by a form of creeping fig that John Creech collected on an expedition to Japan in 1956. Creech found the diminutive ivy-leaved form of *Ficus pumila* adhering to an evergreen oak just in from the beach at Cape Muroto, Shikoku. The U.S. Department of Agriculture's Glenn Dale Experiment Station distributed a fair number of the plants three years after Creech brought it back, but to his disappointment, it never had commercial success. It prospered in the conservatory at Longwood Gardens until about 1976, when it was removed. About two years ago, Creech walked into a clothing store in Asheville, North Carolina, near his home, and to his delight, spotted a small pot of the ivy-leaved fig. How did it get there? A small pot had come from a local nursery, which was one of the original recipients from the 1959 distribution. Eventually, *Ficus* authority Ira J. Condit gave it the cultivar name 'Ivy Leaf'. But it is still waiting to be discovered by the nursery trade and the gardening public.

seeks to preserve the world's important plant species for future generations.

Creech likes to quote Thomas Jefferson's credo that "The greatest service which can be rendered any country is to add a useful plant to its culture." Creech was introduced to the notion of great service before he had even begun his career.

He received his bachelor's degree in horticulture just before the beginning of American involvement in World War II. He entered the Army, was one of 1,500 U.S. officers captured by the Germans, and spent almost two years imprisoned in a camp in Szubin, Poland. Creech used his horticultural training to help his fellow prisoners avoid starvation, growing vegetables in open spaces and in a small greenhouse (which also served as the hiding place for the group's purloined radio).

With such a life-or-death beginning to his horticultural career, it's not surprising that Creech did not follow a path that restricted him to a lab or greenhouse.

According to Alice M. Coats's book *The Plant Hunters*, botanical exploration began as an organized activity during the Renaissance, and the first plant hunters spent most of their time searching for plants mentioned in various Greek and Latin classics. Then as gardening became more popular—and profitable—these horticultural pioneers began to search the world in their race to find the most unusual plants.

Coats's book doesn't list Creech among the likes of the Arnold Arboretum's Charles Sprague Sargent (1841-1927) or the great China-trekker, Ernest Henry Wilson (1876-1930). Her book stops in the late '20s, and Creech didn't begin his explorations until the late 1950s.

Creech emphasizes that to be successful, a plant hunter must be in the right place at

the right time. His own timing couldn't have been much better. After eight years with the USDA Office of Plant Exploration, he was scheduled for his first expedition to Japan and Okinawa in 1955. Russell Seibert of Longwood Gardens had just worked out an agreement under which Longwood would fund the collection of ornamental plants and the USDA would provide the manpower and expertise. This partnership, which lasted through 1972, was the high point of landscape plant collecting, Creech says. "The government has never been enthused about the collecting of ornamental plants. I pushed hard for collecting to continue while I was at the National Arboretum. They've continued that tradition, and are still the leader in the collection of temperate plants. But all the support has to come from private funds." Creech is an advocate not only for more plant hunting, but also for more awareness of the contributions of contemporary explorers (see box, page 20). These horticulturists tend to be low-profile people, not fame seekers; if they are lucky, they will be remembered in a plant name.

My first visit with John Creech was on a warm and sunny day in early February when the first daffodils were in bloom in his North Carolina garden and a large *Helleborus foetidus* was crowned with chartreuse buds just beginning to open. We stopped to look at a burgeoning mass of sedum that was edging itself over some rocks. "That's a pink form of *Sedum* called 'John Creech'. I collected the original plant in 1971 near the Siberian city of Novosibirsk." Creech was surprised when Fishersville, Virginia, nurseryman Andre Viette named the two-inch plant in his honor. It blooms in June, is easy to cultivate, and its cold birthplace has made it hardy at least to USDA Zone 4. Creech

calls it "probably one of the best ground cover sedums you could want."

We walked along the drive and looked over a beautifully kept, raised-stone bed. "My wife Elaine does most of the gardening," he said. Looking at a mass of candytuft, he advised: "If you remember to sheer candytuft back after the first blooming, you'll get a second bloom and thicker plants."

In the course of the morning, I also learned: that the variegated form of *Daphne odora* is hardier than the non-variegated plant; that black bamboo (*Phyllostachys nigra*) is hardy with protection in the Creeches' Hendersonville garden; and that *Parrotia persica* should really be grown for its handsome bark rather than its late winter flowers. And I learned a lot about the role of different individuals—and happenstance—in determining whether a worthwhile plant makes the equivalent of the best-seller list, or languishes as a relative unknown.

Creech invited me to continue our visit inside. On our way through the living room, we passed a wall where medals and honors are interspersed with art objects collected from around the world. Among these honors are a Gold Medal from the A. H. Scott Foundation, the Meyer Medal for Plant Introduction, the Thomas Roland Medal from the Massachusetts Horticultural Society, the Superior Service Medal from the USDA, and the Liberty Hyde Bailey Medal from the American Horticultural Society. Creech served as AHS president from 1954 to 1956.

In Creech's comfortable, bookshelf-lined study, his twelve-year-old Kapro computer was glowing, and spread out beside his chair were page proofs of a beautifully illustrated book, *Garden Shrubs and Their Histories* by Alice M. Coats. "I've just finished my work on that book," Creech explained. "My job was to go through Coats's original text and add assorted bits of information to make it more interesting to American readers."

In that book, Coats listed important ornamental shrubs and the people responsible for making them available to gardeners. I asked Creech to name what he considered the most important plants among the hundreds that he brought or helped bring into the country.

He pondered for a moment, adjusting the collar of his sports shirt, emblazoned with time- and wash-worn hibiscus. "Well, first and foremost would be the crape myrtle, *Lagerstroemia fauriei*. It's impor-



tant because it illustrates the value of using wild plants as germplasm for improving and protecting existing garden plants.”

On a 1956 Longwood-sponsored trip, Creech first collected seeds of the wild species, a relative of the popular ornamental crape myrtle, *L. indica*, from its native habitat near a rocky streambed on the small Japanese island of Yakushima. The area had not been visited by a Western collector for almost forty years. “The common crape myrtle was already a popular plant,” says Creech, “but I was attracted by this particular plant’s cinnamon-colored bark and the way it peeled away from the trunk.”

The tree’s most important characteristic turned up later. The late Donald Egolf, a research horticulturist at the U.S. National Arboretum, crossed *L. faurei* with *L. indica*, and discovered that Creech’s tree conferred other crape myrtles with a genetic resistance to powdery mildew (*Erysiphe lagerstroemiae*). Powdery mildew is a disease that disfigures both leaves and flowers of the cultivated plants, especially in the Southeastern United States.

Egolf and the arboretum breeding program eventually produced twenty mildew-resistant hybrids, some with floral colors never before seen in crape myrtles. The bark of *Lagerstroemia faurei* has made the species a desirable garden ornamental in its own right; ironically, the tree is now threatened in its native Japan by intensive cutting for wood and for charcoal.

“I consider this plant my most important introduction because it was a deliberate effort on my part to get a plant that nobody knew about out into cultivation and the world of horticulture. Even without knowing anything about its merits, when I was on Yakushima I was determined that I would get it back to the breeders and the nurserymen.

“That’s one of the ego trips for any plant collector—the drive to introduce a plant for the first time. Of course, it’s really not that big a deal, since a number of things can happen. The first introduction may die, or someone else may introduce the same plant at a later time and everyone forgets that you brought it in first. But this plant,

On an expedition to Japan’s Yakushima island, Lagerstroemia faurei’s cinnamon-colored bark caught Creech’s eye. He considers it his most important introduction.

PAMELA HARPER

GIANTS NOT YET IN HISTORY BOOKS

If you talk to John Creech for any time at all, chances are he will express his frustration that even the most avid gardeners know little about the plant hunters of today. "Most gardeners only know the men of the past," he says. "The contemporary collectors, for the most part, are ignored unless they work to push themselves into the public eye."

Creech is visible to many through his generous contributions of time, advice, lecturing, and writing for various nonprofit horticultural organizations. When he "pushes," it tends to be for recognition of another plant explorer or horticultural pioneer that he feels has been overlooked.

For example, he was disturbed that the story of the discovery of the New Guinea *impatiens* was described this fall in two separate publications as being made by "two explorers from the National Arboretum." "That was Harold Winters and Joe Higgins," says Creech. "It was one of the most important finds for ornamental horticulture in many years."

In 1962, Creech made a memorable exploration of Nepal near its unmarked boundary with Tibet with Francis de Vos. The men were warned that if they accidentally wandered into Tibet, they might not survive to share the plants they found. De Vos was at that time the assistant director of the U.S. National Arboretum. "This was the first American plant exploration of Nepal, and he was so elated that he followed it with a trip to Sikkim." But de Vos elected to give up trekking for the privilege of shaping two major American botanical gardens.

When de Vos died last year, Creech took the time to memorialize his contributions to horticulture.

"Fran de Vos and I traveled the same road from the time we were at the University of Massachusetts, later to find ourselves still together in Washington. He was at the National Arboretum when I was in the Office of Foreign Plant Exploration. Both of us were under the watchful eye of that magnificent mentor, B. Y. Morrison, both in our jobs and at the American Horticultural Society." De Vos served as AHS secretary in the early 1950s.

De Vos decided to leave the arboretum in 1967 to become the first director of the Chicago Botanic Garden, says Creech, "because of the great challenge to transform a 300-acre swampland into the magnificent garden we know today. We talked about this kind of opportunity often on the occasion of our journey to Nepal, where he tasted the exciting life of the plant collector." De Vos served as president of the American Association of Botanical Gardens and Arboreta in 1968-69.

After a decade getting the Chicago garden off the ground, de Vos moved on to the Minnesota Landscape Arboretum, where he pioneered the concept of home demonstration gardens as a way of inspiring and educating gardeners about the use of a wider variety of plants. These are now known there as the De Vos Home Demonstration Gardens. He spearheaded the fund raising that allowed the arboretum to build sixty acres of display gardens and a learning center where children and their families could learn about horticulture.

Our gardens have also been enhanced by his magnolia breeding while at the National Arboretum, says Creech. "The objective of his highly successful breeding program was to develop late-blooming plants, to lessen frost damage." His *Magnolia* 'Ann', *M.* 'Judy', *M.* 'Randy', and *M.* 'Ricki' were followed by hybrids of a similar nature by W. Kosar.

"The 'girls,' as they are sometimes called, are now receiving considerable attention," says Creech. "Few gardeners will, unfortunately, associate the plant in their gardens with this remarkable, modest giant of American horticulture."

—Kathleen Fisher, Editor



COURTESY OF JOHN CREECH

Francis de Vos joined Creech on a 1962 plant-hunting trip to Nepal.

in the hands of Egolf, revolutionized the development of crape myrtles in this country. If he hadn't discovered or observed that it was resistant to powdery mildew—I had no way of knowing that because it was not afflicted where I collected it—it probably would have remained in obscurity, just another introduction. So this crape myrtle demonstrates that it's when you put the plant collector, the breeder, and the nurseryman together as a team that you really get results."

Also in 1956, Creech collected what he considers his second most important plant in the Yatsugatake Mountains near Nagano, Japan. The seed of the plant, a white birch, *Betula platyphylla* var. *japonica*, was collected from one tree growing in an open field at 1,780 feet above Shibuya Onsen, which Creech describes as a "rather rickety" hot springs resort hotel.

Researchers at opposite ends of the country would eventually make two important observations about this tree. Word came back from Florida growers that the trees tolerated that state's intense heat, a phenomenal trait for white birches, and from the University of Wisconsin that the tree was resistant to bronze birch borers. Twenty-seven years after Creech collected the first tree, a selection was registered by the U.S. National Arboretum as 'Whitespire'.

"Again," said Creech, "it points out the importance of the relationship between the plant collector, the person in the arboretum or botanic garden or other institution who maintains the germplasm, and the nurseryman who puts the tree out on the market. Both plants followed the same path to success. It required this team effort. And the curious thing is the individuals that were involved with the development of this birch had no direct tie-in with each other—they were working independently and it happened that everything just fell into place."

Sometimes Creech has collected plants that were in cultivation decades earlier, but never had major commercial success. Japanese sedge grass, or *Carex morrowii* var. *expallida*, was first introduced in the 1800s, but was used only as a potted plant in conservatories. As late as the 1930s, it was thought not to be hardy north of southern New Jersey. In 1955, Creech retrieved some of the sedge grass from the woods in the low mountains of Honshu. Today, you see it outdoors in gardens throughout the country.



But for the most part, Creech says, he kept his eyes open for plants described in the literature as “not in cultivation.” One such plant was *Camellia lutchuensis*, which he found on Okinawa in 1955. He calls it a “minor plant” because it can be grown only in subtropical climates. But for camellia breeders, it has fascinating potential because of its fragrance.

If ever a flower looked like it should bowl you over with a fantastic fragrance, the camellia is it, and that look has fooled many an ill-informed flower lover over the years. In the 1936 movie “Camille,” Greta Garbo walks into a Parisian flower shop for a nosegay of her favorite flower, and buries her nose in the petals to inhale their supposedly sumptuous scent.

Whether breeders will succeed in using *C. lutchuensis* to produce a fragrant and hardy camellia is dubious, says Creech, “but nevertheless, that’s the direction they are going.”

Another plant valued by breeders is *Rhododendron pseudochrysanthum*. It bears flowers that are white or pink tinged with white, but is prized primarily for its rigid leaves and dwarf form. The compact shrub is found in the conifer forests and gravelly slopes of Mount Morrison (Yushan) on Taiwan, which at 14,000 feet is the highest peak between Washington, D.C., and the Himalayas, Creech notes. This compact shrub was first collected in 1918 by E. H. Wilson. To gain access to the plant in 1967, Creech climbed through fog, across log footbridges, and along shallow ledges cut into sheer rock walls.

“Nobody had gone back to the top of Mount Morrison since Wilson’s time, so here was a fresh array of germplasm at a time when nurserymen were enthusiastic about developing low-growing and interesting rhododendrons. What I contributed shows up every now and then in new hybrids.”

Of course, not every interesting plant is found on a remote mountaintop. Sometimes the way a plant is found is decidedly uneventful. A rising star among gardeners is *Chrysanthemum pacificum* (now *Ajania pacifica*), which Creech and Sylvester (Skip) March, chief horticulturist at the

MICHAEL S. THOMPSON
Creech wasn't very excited about the Japanese blood grass he found growing at the Aichi Prefecture Agricultural High School in Nagoya, but it has become a popular ornamental.



MARYL

Skip March and Creech discovered Miscanthus sinensis 'Morning Light' during a 1976 trip to Japan.

National Arboretum, found at the Kogara Co-operative Nursery Bonsai Center in Angyo. In 1982, they brought back a single specimen of this now widely praised plant, which was being grown as a companion plant for bonsai. Creech has since collected it from its native habitat on the seashore.

Creech and March first spotted the now popular ornamental grass, *Miscanthus sinensis* 'Morning Light', on a trip to Japan in 1976. "Skip and I were walking along a back road and Skip remarked what a nice plant that grass seedling was." The grass was in the private garden of Masato Yokoi, an extraordinary collector. "Now after fifteen years, it's moving into the nursery market."

Creech and March found another star of the ornamental grass world, Japanese blood grass (*Imperata cylindrica* 'Rubra'), at the Aichi Prefecture Agricultural High School in Nagoya. They were probably more excited about the school than the plant. "This little high school had a huge nursery and they taught landscape architecture and other things that you would get in a four-year college here." They never publicized the discovery of the grass—just made it available to the arboretum. At that point, a plant becomes fair game: available to universities, commercial nurseries, an arboretum employee's sister-in-law. Creech still speculates about whether a named cultivar of this grass, 'Red Baron', came from his collection. "Here's a case," said Creech, "of a plant that we weren't particularly excited about, and it becomes the greatest

thing that ever happened. The collector has no control over what happens to his introduction."

But just as plants he feels lukewarm about can become big hits, some he finds extraordinary may stimulate no interest in the trade. He recalls vividly the day he found *Hemerocallis littorea*, a fall-blooming daylily he collected in November 1955 on an excursion to Ashizuri-zaki, a heavily forested cape at the southernmost tip of Shikoku, Japan. "There was no bullet train to the area, just a small bus," recalls Creech. "I walked along until I reached the shore, and at the end of the cape, which runs like a backbone into the sea, the cliffs were literally covered with this marvelous daylily, with thousands in bloom. I remember in my excitement, dashing down there, and if I had been less careful, I would have gone right over the edge.

"I brought it back and wrote about it, but except for one breeder in Pennsylvania using it, nothing else has happened. I thought a daylily blooming so late in the year could be an especially fine plant for the Southeast and for Florida. In North Carolina it flowers in October and November. But so far, nothing."

Likewise, he suspects that many of the azaleas he collected—and Creech introduced more species from Japan than any other contemporary collector—are sitting in a flower pot in a private collection or a bed in a botanical garden. One of these is 'Ama Gasa', collected in 1956, a Satsuki hybrid with brilliant red-orange to dark orange flowers. "It looks like it's on fire when it's in bloom. But it never achieved success beyond local recognition that 'This particular azalea is certainly attractive.'"

Given this lack of control, and the extraordinary length of time it can take for a new plant to get into the marketplace and out to gardeners—if it ever does—it would seem that plant collecting could be a discouraging occupation. But Creech is philosophical.

"Your collection is a service, and since the main objective is to get the plant into a safe depository, botanical garden, arboretum, nursery, or even to an amateur breeder, you have no right to say what happens to that plant and if someone chooses to name it, that's their privilege. But I don't know any plant collectors who have gone into the development end of the business. It wouldn't fit the character of being a plant collector. The gratification is in the joy of the search and sometimes the

spinoff, when a plant becomes popular and it's mentioned that the collecting was done by so-and-so."

Creech shifted his position in his chair and glanced out the window at the garden. Not only is there no equivalent today of the Longwood-USDA program for collecting ornamentals, he said, but other factors have made plant collecting increasingly difficult. "In the olden days, plant collectors went anyplace, but nowadays most people know that the plants in their country are part of their natural heritage, and they don't like you to walk in and take anything you want."

While that's as it should be, it means more paperwork before the trip, as well as the quarantines and inspections for diseases and insects that take place when it ends.

Creech gathered the coffee cups from our morning's interview, and we went out again to his garden, where he recalled his last, albeit unofficial, collecting trip.

"Last year in September, when Skip and I went back to Japan for Expo '90, I knew there was a place south of Osaka on the Key Peninsula that I wanted to go back to. We planned our schedule so we had four or five days to look for more *Chrysanthemum pacificum* and some other plants down in this remote little place.

"I guess I'm an armchair collector now. But if an offer came today, I'd probably be off again. . ."

Peter Loewer's most recent book is The Wild Gardener from Stackpole Books.

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The Elegant *Echeverias*

STORY AND ILLUSTRATIONS
BY KATHLEEN CRAWFORD

These beautiful, easy-care succulents hold interest for both historians and mathematicians.



Echeveria agavoides

The genus *Echeveria* offers a variety of tender, succulent perennials for diverse situations—from carpet bedding to bold borders, rock gardens to windowsills. The genus *Echeveria* was named for Atanasio Echeverría, a Mexican botanical artist who created 2,400 drawings for a planned flora of Mexico between 1789 and 1809. The flora was commissioned by Charles III of Spain and the project was led by botanists Jose Marianos Mocino Suarez Losada and Martin de Sessé y Lacasta. The flora was never completed and all of Echeverría's original drawings were lost. However, tracings of his drawings were made by Swiss botanist Augustin Pyramus de Candolle, who named the genus in the artist's honor in 1828. De Candolle was the first person to describe the genus, and two of the species (out of the four he studied) he knew only from Echeverría's drawings (*E. gibbiflora* and *E. teretifolia*).

Echeveria is a genus of about 117 species and belongs to the crassula family, Crassulaceae. *Echeverias* are native to warm-temperate and subtropical parts of the Americas, from Texas to Argentina; most are Mexican and are found in mountainous areas of their homeland at elevations of 1,500 to 13,500 feet. Somewhat xerophytic in nature, but not desert plants, they like some moisture, but insist on the good drainage they find in rocky and brushy hillsides, cliffs, and canyons. In Mexico, *echeverias* grow with summer rains and winter drought. They resist the dryness with succulent leaves instead of extensive root systems, which in most cases makes them ideal pot plants. They seem to like the dry, warm, enclosed feeling of clay pots—they are often seen this way in patios and gardens in Mexico.

Echeveria leaves are arranged, like the scales of pine cones, in a "Fibonacci angle." Named for Leonardo of Pisa (the mathematician Leonardo Fibonacci, 1170-

ECHEVERIA PROPAGATION

Most echeverias are easy to propagate by offsets—just cut them off and pot them up in a porous, well-drained medium, preferably a mix of good garden soil, sharp sand, and leaf mold. Those that do not produce offsets can be propagated by leaf cuttings. To do so, gently but firmly ease a leaf off at its base, including the dormant bud. Lay it in a shallow trench on dry sand and keep in semishade and reasonably warm, watering only occasionally. Pot it up when roots form and a tiny plantlet develops at the base of the leaf.

Some echeverias, such as *Echeveria gibbiflora*, never have offsets, don't form new plants from leaf cuttings, and seldom set seed in the average window garden. However, sometimes when flower stems are on for a few months, new plantlets will form on the old stems. If this happens, they can be detached and potted. These echeverias can also be propagated by cutting off the entire leaf rosette together with two to three inches of stem. Place it on top of a bit of damp moss in an otherwise empty pot. To prevent rot, rest the leaf rosette on the pot rim. Eventually roots will form and the renewed plant can be properly potted up. Meanwhile, lay the beheaded trunk in a trench of sand. Keep warm and moist, and it will bud out with plantlets that form from the dormant leaf axil buds. When roots develop, these can be removed and potted.



Echeveria gibbiflora 'Metallica'

1240), the angle constitutes $\frac{8}{21}$ of a full circle. It is these leaves and their harmonious spiral arrangement into rosettes that make echeveria such an interesting plant. Each entire rosette of leaves has the aspect of a flower. Some are symmetrical and refined, others huge and flamboyant. They come in a wonderful array of colors, varying from near-white to maroon. A plant may be bright geranium pink, lavender edged with cerise, gray with pink edges, or green touched with red. Some have outer leaves of red-purple, centered with pale blue-green new leaves. Others have an almost metallic sheen and subtle amethyst glow. The leaves may be frilly edged or plain; wavy, rounded, or pointed; smooth, furry, or velvety.

Flower stalks vary in height from miniatures less than a foot high to impressive stalks up to five feet tall. Little bell flowers uncurl one after another alternately along the stalk. Colors range from yellow and red to intense pink. Each flower and bract along the stem—in fact, the entire plant—seems a carved work of art, thick and perfectly formed. As each stalk opens its flower for a month or two, and as different species have different flowering times, a large collection of echeverias can provide long-lasting bloom the year around. All echeverias contain well-developed nectaries—glandlike organs at the base of the flower—that lure hummingbirds.

Many echeverias can be grown outside in USDA Zone 10, a few in Zone 9. In these mild U.S. climates and Mexico, echeverias have long been used as low or slightly taller bedding plants, especially in rock gardens or as accent plants among herbs. An ancient tradition, still seen occasionally in Mexico, is to group echeverias in the form of a turtle. The smaller ones—and even some of the larger species—look quite wonderful in the interstices of an earth-laid rock wall, embankment, or terrace. Out of doors, echeveria goes well with other rosette-forming plants such as *Dudleya*, *Aeonium*, *Sedum*, and *Graptopetalum* species, which all prefer the same good drainage.

Echeverias grow nicely in the partial sun of morning or afternoon exposures, in full sun, and also in slightly shaded locations near shrubs. They especially enjoy being sheltered by rocks, seeming to take comfort from their heat-storing capacity and the cool, damper root-runs underneath. Greater exposure to sunlight produces greater color—reds and yellows—in the



Dudleya pulverulenta with canyon wrens.

leaves. Sometimes frost has the same effect, if it doesn't kill the plant.

In most of the United States, echeverias are best grown in pots, so they can easily be brought in for the winter. They are very desirable indoor plants, not only decorative but tidy, never shedding leaves or debris. They do best in a sunny window or under a grow light.

Most echeverias grow rather slowly. Only those in very small pots or the fast-growing species should be repotted annually; otherwise once every two years is fine. Some can remain in the same big pot even longer, but it is a good idea to tap these out every couple of years, check the roots, and add some good fresh soil mix containing sand and leaf mold.

Echeverias have few problems or pests. Rot is possible if the plant is poorly drained or kept too damp. Snails like echeverias, but can be controlled by hand-picking, diatomaceous earth, or if this fails, with a drop or two of snail poison under the basal leaves. Ants seem to have a deleterious effect when they nest in the bottom of echeveria flowerpots.

It's best to fertilize about once a month with liquid plant food. More will be needed during periods of rapid growth, and less when plants are growing more slowly in the winter.

There are numerous hybrids and cultivars among the echeverias. All are variable, so there is quite a bit of nomenclatural uncertainty. If that weren't confusing enough, there are intergeneric hybrids, such as \times *Pachyveria* (*Echeveria* \times *Pachyphytum*), \times *Sedeveria* (*Echeveria* \times *Sedum*), and \times *Graptoveria* (*Echeveria* \times *Graptopetalum*). Some nurseries label all the hybrids and cultivars correctly, while

others sell them all simply as echeverias. The following are some of the best and most popular:

Echeveria agavoides, sometimes called the molded wax echeveria, forms a nine- to ten-inch rosette of many closely packed, thick, and pointed light green leaves, sometimes brown tipped. Many graceful sixteen-inch stalks of pink flowers are touched with yellow. *E. agavoides* var. *multifida* has amber-colored leaves that are edged and tipped with rich dark red. Hardy to Zone 9.

E. elegans 'Conchas' is a small cultivar with perfectly formed, near-white rosettes of stemless leaves. The offsets form attractive groups and clusters. Pink flowers are borne on a six-inch-high stem. Zone 9.

E. gibbiflora is a fine, big species that has parented some of the most spectacular, large echeveria cultivars, such as 'Metallica', 'Crispata', and 'Carunculata'. These are all long-lived plants. The stalks, which grow up to five feet, bear bright pink flowers that are exceptionally vivid and colorful, even more so because the flowering stalk itself becomes an intense pink. *E. gibbiflora* forms a leaf rosette about a foot across. Zone 10.

One of the most popular smaller echeverias is *E. \times imbricata*. This hybrid has been grown for years as a bedding plant in Zones 9 and 10. Although a number of echeverias are called "hen and chicks," the name is especially apt for this one because of its stemless clusters of offsets. Gray green leaves are pink edged and form tightly packed, symmetrical rosettes. Short stems bear nodding pink flowers.

E. harmsii is a small plant with branching stalks tipped with rosettes of pointed leaves. The bright red flowers are among the largest in the genus and are borne on eight-inch stalks. This echeveria doesn't form the usual flower-form leaf rosettes, but is more rangy in growth. It is a good choice for massing and as a ground cover in Zones 7 through 10.

E. \times mexecensis forms six-inch-wide rosettes of heavy, gray green and rose leaves that are curved. The texture and glowing colors combine to make the whole plant seem as if it were shaped from some lovely stone. The numerous stalks of flowers are eight to nine inches tall, with light pink flowers. Zone 10.

E. pulvinata, sometimes called plush plant, forms a minishrub ten to fourteen inches high. The branching stems have rounded leaves and are tipped with velvety leaf rosettes. Bright red-orange, yellow-

touched flowers are borne on a short, straight stalk. Zone 9.

E. setosa, or Mexican firecracker, forms flat, low six- to seven-inch rosettes of dark green leaves that are all covered with shining white hairs. Ten- to twelve-inch flower stalks have several red-touched yellow flowers toward their tips. Hardy to Zone 9.

E. subrigida has a handsome, big, low-growing rosette of relatively few leaves that are near-white edged with red. The stalks of the large red flowers grow two to three feet tall, and each flower contains scarlet nectaries. It is hardy to Zone 10.

In California, Arizona, and northwestern Mexico, gardeners grow an echeveria lookalike—native *Dudleya* species that are in the same family as echeveria. When brought into cultivation, these lovely succulents do well in the rock garden (to Zone 9) and even better in pots.

D. pulverulenta, the powdered dudleya or chalk lettuce, forms a foot-wide stemless leaf rosette. It gets its name from its powdery looking leaves, which are striking against the rocky cliffs where they usually grow. Curving stalks of red flowers bloom in summer. *D. arizonica* is similar, but with pointed, narrower leaves.

D. lanceolata is a wide-spreading species that grows in a variety of habitats from coastal dunes to mountain areas. The narrow and pointed leaves can be gray green or bright green. Flowers are yellow, pink, or red, or shades and combinations of these colors. *D. lanceolata* forms offsets; older offsets become cushions of leaf rosettes two feet across and mounded up to a foot high in the center, though usually the plant is only four to six inches high and across.

Graptopetalum, *Pachyphytum*, and *Sedum* species are other succulents that form leaf rosettes and like similar growing conditions. They are sometimes found growing with echeverias in Mexico.

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A Variety of Variegates

Variegated plants come in so many shapes and colors and patterns, most gardeners eventually succumb to their charm.

BY ELISABETH SHELDON

Variegated plants are not a universal favorite among gardeners. While some love them, others loathe them, thinking them unnatural. Even those of us who admire them can be exasperated by their tendency to revert to plain green. Owners of *recherché* variegated plants get in the habit of looking at them sharply as they make the rounds of the garden, readying themselves to swoop down and pinch out any leaves that show signs of reversion, since that is the only way to stop them from backsliding, and even that doesn't always work.

But most of us have come to value them for the way they contribute color and variety of pattern to the landscape all season long, instead of being effective only during a brief flowering period.

Plants with variegated leaves come in all categories: annuals and perennials, grasses, vines, shrubs, and trees.

As to annuals, I think the flashiest ones—coleus, caladiums, and the variegated pelargoniums—are pretty well known. Some of the color combinations are so outrageous that they bring a shudder to those of us who seek serenity rather than frenzy in the garden. They need careful placing, in some cases a separate area. They don't fit in most perennial gardens. Let's talk about plants that do.

First it should be noted that there are a few perennials that have variegated leaves



MICHAEL S. THOMPSON

Left: The native dog-tooth violet or trout lily has mottled brown or purple leaves. Right: In spring Hosta fortunei 'Albo-picta' has variegated chartreuse and deep green leaves, but the rest of the season the leaves are solid green.

JESSE W. HARRIS

HOULTUYNIA: MANY COLORS, MANY USES

BY ADELAIDE C. RACKEMANN

In Asia it is considered an herb. In France it is used to beautify small ponds. It makes a nice ground cover, too, if you don't mind its absence in winter. The plant is *Houttuynia cordata* 'Variegata' (or *H. cordata* 'Chameleon'), a relative newcomer to American gardens. While it has been on the market for some time, it has become widely available from nursery catalogs only in the last few years.

In my own garden, it is simply an accent, combined with other small perennials—*Epimedium*, dwarf goatsbeard (*Arunacus astilboides*), sweet woodruff (*Galium odoratum*)—growing in partial shade with a background of New York ferns (*Thelypteris noveboracensis*). I bought a plant of it three years ago, in the autumn. During the winter, it completely vanished, or so I thought. Some plants don't survive our changeable Baltimore winters and I have learned to accept such disappointments. But in early April it reappeared, a bit tentatively, its green, yellow, and pink leaves slowly uncurling along the ground. Since then, I have come to appreciate it even more.

Among its advantages, *Houttuynia* seems to be unaffected by pests or diseases. Moreover, it is hardy, certainly to USDA Zone 5 and possibly as far north as Zone 3. It is easily propagated by division. In fact, this deciduous plant spreads by slender rhizomes and can actually become invasive. Far from vanishing, it has a way of popping up in the middle of another plant, as it did with my woodruff, or in the nearby lawn. But it can be easily removed from those places where it isn't wanted. It can also be started from fresh, ripe, fleshy seeds, sown in a sand-peat mixture and kept moist.

Houttuynia, which was named for the eighteenth-century Dutch natural history writer Martin Houttyn, is a genus with a single species. It is a member of the lizard's-tale family, Saururaceae, which is considered an aquatic family. At home in the temperate zone of east Asia, its height varies from six to twenty-one inches depending on moisture and soil conditions. In my garden it is somewhere in between.

The stems of this plant are erect and thin, and the three-inch-long leaves are heart shaped. *Houttuynia* is showy mainly because of these alternate, five-veined, variegated leaves, which are reddish tinged in full sun and in the fall. But the small white flowers also add interest. Appearing in late spring, each flower, emerging from a leaf axil, has a spike that may be a half-inch to an inch long. This inflorescence contains a cluster of florets that look like petals.

When I finally found that my *Houttuynia* was not a garden

casualty after all but a vigorous grower, I began dividing it and placing it in many different locations. It is easy to transplant, as long as it is well-watered in the process. Since it is supposed to be aquatic, it does best in soil that retains some moisture. However, it survives—although it spreads less freely—in dry soil. Left undisturbed for a season or two, it forms a nice clump. In shade, the red disappears from the leaves, but the green and yellow variegation is still striking, and sometimes the foliage has a slightly bronze cast.

The ordinary, unvariegated *H. cordata* is simply a pleasant green, and while less desirable visually, has a multitude of uses. It was brought to the attention of Janet Walker, curator of the herb garden in the U.S. National Arboretum, by a Vietnamese woman who said she was used to having it in soups and salads. Although found in Japan, China, India, Nepal, Taiwan, and Java, as well as in Vietnam, *H. cordata* seems to have been most recently introduced to East Coast nurseries from Korea.

Interestingly, the plant is mentioned in Sturtevant's "Notes on Edible Plants," part of the twenty-seventh annual report of the New York Department of Agriculture, published in 1919. But while it is described at length in oriental herbals, *Houttuynia* has been ignored in English ones.

If crushed, the leaves smell faintly of oranges. In addition to being eaten in salads in China and Vietnam, they are also used as a garnish for fish stew and for boiled, fertilized duck eggs—these are eaten three days before they are expected to hatch—and are spread over meat and fish to keep them fresh.

Even more fascinating are the various medicinal uses of *H. cordata*. According to Lily Perry's *Medicinal Plants of East and Southeast Asia*, the herb is pulled from the ground in late summer or autumn, washed and dried, boiled in water, and used both internally and externally. Prescribed for weak lungs, hemorrhoids, and the coughing up of blood, it is also used to treat abscesses, wounds, skin diseases, snake bites, indigestion, and diarrhea, among other ailments. In parts of Indochina, the flowers of *H. cordata* are employed to help bring about the expulsion of a dead fetus.

If Americans have neglected the practical uses of this versatile plant, we are at least welcoming its variegated form into more and more of our gardens. It always attracts attention, whether as a border, a ground cover, as an aquatic plant as the French use it, or as I have, as an unusual and colorful accent.

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in spring but always become solid in color later on, alarming the person who has bought them unaware of their habits. *Hosta fortunei* 'Albo-picta', for instance, has bright chartreuse leaves edged with deep green in spring but in summer looks like any other plain hosta. There are, of course, many fine variegated hostas that retain their yellow or white markings.

And then there is the large, coarse-looking *Astrantia* a friend brought me one September, assuring me that I would find it

sensational the following May. I couldn't believe it, but poked it into my shade garden for the sake of friendship and forgot about it. The following spring as I was weeding and tidying up in that area I encountered what appeared to be an exotic greenhouse plant, dramatically displaying glossy, deeply cut leaves of cream, yellow, and green. Although it looked scarcely related to my ordinary *Astrantia major* and *A. maxima*, it was indeed an *Astrantia*, according to the marker I found later—A.

major 'Variegated'. In summer, the sensational color slowly disappears leaving you with a rather common-looking plant. But if you plant it close to a group of *Hel-leborus orientalis*, especially the jade green speckled ones, their handsome new leaves spread out and get all the attention when the *astrantia* has lost its allure later in the season.

Among ground covers you will find variegated vinca (*Vinca minor* 'Sterling Silver'), pachysandra (*Pachysandra ter-*

minalis 'Silver Edge'), and several ajugas (*Ajuga reptans* 'Silver Beauty', 'Burgundy Glow', and 'Burgundy Lace'). For rock gardens, there is an elegant *Arabis* whose acquaintance I made at Oliver's Nursery in Connecticut. *A. ferdinandi-cobugi* 'Variegata' has flat, glossy, chartreuse and white oblong leaves that form small rosettes, and which in turn form a large, tight rosette. The flowers are small and white. Since the plant comes from Macedonia, I was afraid my specimen would be longing for its native mountain air during our summer heat, but it's come through its first trial with flying colors, perched serenely on top of a raised bed in soil that is mostly sand and grit with a little garden soil and old manure added.

When the ground covers *Lamium maculatum* 'Beacon Silver' and 'White Nancy' finally arrived here from England, those of us who had been tantalized and frustrated by pictures of them were finally gratified. Their green-edged silver foliage has, especially in part shade, a sheen that makes it one of the few grays we're truly justified in calling silver. 'White Nancy' produces white flowers and 'Beacon Silver', pink. These are much finer plants than the ordinary splotchy-leaved lamium, whose traveling urge is hard to curb. Some people say 'Beacon Silver' is more likely than 'White Nancy' to become diseased, but I haven't had the slightest trouble with it in the several years I've grown it, in many different situations including heavy clay in full sun.

Another relatively new ground cover is *Houttuynia cordata* 'Chameleon' ('Variegata'). It has green leaves painted with swirls of cream, rose, and deep red, varying according to the season and site. The flowers are small and white and are, I think, negligible. Although it's sold as a shade plant and has been beautiful here under an apple tree, it is said to produce even more luscious color in sun. And while it likes moisture, it retained its vigor during the heat and drought of '88 to the point of crawling under some heavy old railway ties and bouncing up on the other side. Perhaps the ties kept the roots comparatively cool and moist. It comes up so late in the spring that, forgetting where I had lined it out, I planted divisions of a dwarf aster on top of it last year. Embarrassing—but they all managed to hack it through the summer. (For more on *Houttuynia*, see page 28.)

There are several variegated lamias on the market, most of them too



PAMELA HARPER

Above: Houttuynia cordata 'Variegata' can be used as an herb, a ground cover, a pond plant, or as an accent in a perennial border.

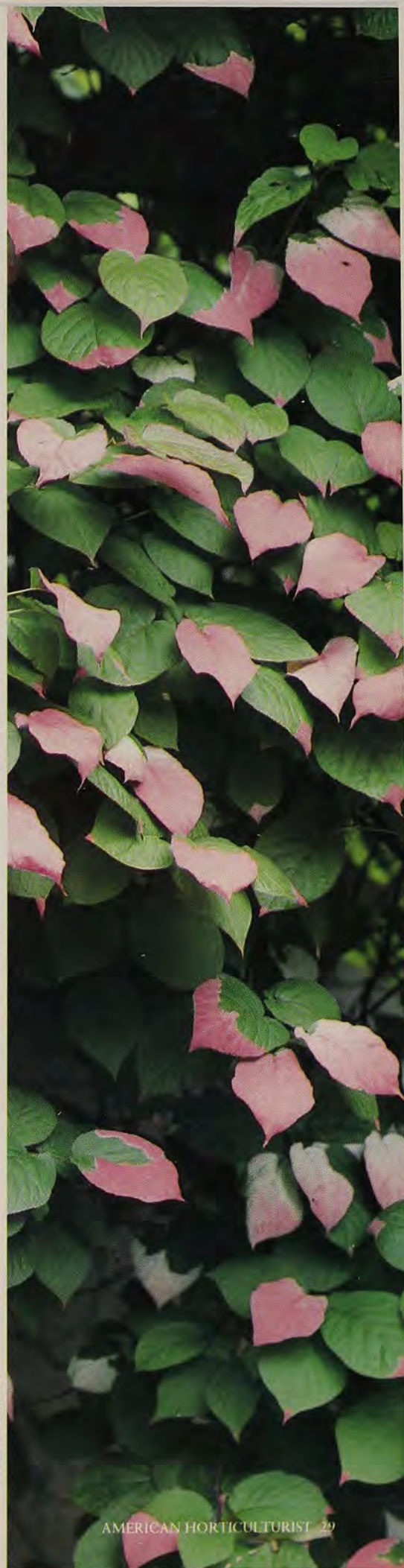
Right: Gardeners may have to wait a few years for the variegated white, pink, and green leaves of Actinidia kolomikta to show their colors.

energetic for a restricted shady area, but good for covering a lot of otherwise wasted space. The foot-tall *Lamiastrum galeobdolon* 'Herman's Pride' is of a different order, confining itself to making extremely attractive clumps of small, silver-patterned leaves. It has clusters of small butter yellow, hooded and lipped flowers in spring and is an untemperamental plant that doesn't worry you with all kinds of mysterious needs that you don't know how to fulfill.

Woodland plants with variegated foliage are particularly welcome. The patterns are especially effective in part shade and provide visual interest when flower color from most shade-loving perennials is long gone.

Two of our prettiest woodland natives are *Goodyera pubescens*, the downy rattlesnake plantain, and *Chimaphila maculata*, known as pipsissewa in Virginia where I first saw it, and also as spotted wintergreen. The *Goodyera* is really an orchid, although its small white flowers on tall bare stems don't live up to what one thinks an orchid should be. The beauty is in the tapered oval leaves that circle the flower stem near the ground. In addition to a white midrib, the leaves are marked with an interlocking, netlike white veining that must have reminded someone of the scales of a rattlesnake, accounting for its threatening name. (As if *Goodyera* weren't enough of a handicap!) The fragrant, nodding, waxy white flowers of pipsissewa are borne on ten-inch woody stems, well above the whorls of sharply toothed shiny pointed leaves with white midribs and veins. They grow in dry woods, often near pines, but, like the rattlesnake plantain, are difficult to domesticate.

Each leaf of our mottle-leaved *Erythro-*



C. COLSTON BURRELL



nium americanum (dog-tooth violet or trout lily) comes from an offset bulb that will not produce its yellow flower until it is several years old. But the leaves—thick, smooth, and splotched with brown or purple—are attractive in themselves. There is a splendid erythronium from the Pacific Northwest, *E. revolutum*, with ten-inch creamy mottled leaves that do, I must admit, go dormant in the heat of summer, but are impressive in spring, surmounted by their winged, reflexed flowers.

A relative of our shade-loving Solomon's-seals, *Polygonatum odoratum* 'Variegatum', comes from Japan. It has the same graceful habit as ours, with small flowers hanging from arching stems. At three feet, it's not as tall as the American giant Solomon's-seal, *P. commutatum*, but its leaves are edged with yellow so that it seems to bring flickers of sunlight into the woods.

Pulmonaria is another carefree shade lover, but I wouldn't bother with *Pulmonaria officinalis* if I were you. The species (lungwort, Jerusalem sage, or, in England, soldiers-and-sailors or spotted dog) may be greeted with enthusiasm when it puts out its pink and blue bells before any other plant has caught on to the fact that it's spring. But later, when its dusty splotched leaves turn mildewy, it fails to move the soul. Besides, it spreads too fast. *P. saccharata* 'Mrs. Moon' is much nicer, having similar pink and blue bell flowers but larger, cleaner, more clearly, heavily spotted gray and green leaves. The very best, though, is one sold by Canyon Creek in Oroville, California, *P. 'Roy Davidson'*, which has very long, slender dark green leaves, dramatically spotted with silver. These make a fine clump, flaring out from the center and looking handsome and unmildewy all summer. The spring production of white, palest pink, and sky blue flowers is a bonus.

For full sun, there are several variegated perennials available—the gold- and silver-edged thymes, pineapple mint (*Mentha suaveolens* 'Variegata'), and a physostegia or false dragonhead that I keep ordering and that the nurseries never send me. It must have become chic and other people get there before me. I do have, as a gift from someone, a large variegated *Sedum spectabile*, which—and I hope the donor does not see this—I find perfectly revolting. Fleshiness and splotches of a sickly yellow are a bit too much for my taste, which I realize is not always that of the next person. I'm hoping to be able to make a gift of

it to him—or her.

Touches of cream, rose, wine, and plum on the grainy, leathery, pungent leaves of tri-color sage are another matter. When this plant is burgeoning in midsummer, surrounded by gray green plants with rose, plum, or white flowers, I would give it first prize. I'm cheating, of course, to indicate that it's a perennial here on the cold edge of USDA Zone 5. I pot it and bring divisions of it into the unheated back porch or an unheated upstairs bedroom for the winter.

There are many striped grasses and bamboos—you can even choose between horizontal or vertical stripes. Now that grasses are in great vogue you will have no trouble locating striped *Miscanthus*, *Molinia*, or the sedge, *Carex*, and many more, all most effective when properly placed. But the tall striped ones, especially, seem too insistent to plop willy-nilly into borders of anything but the most imposing perennials. There are a few small variegated grasses one might try: little bluestem (*Andropogon scoparius*, now officially *Schizachyrium scoparium*), which starts out blue-green but ends the season tinged with pink; or the dainty *Hakonechloa macro* 'Aureola', which is bright yellow and deep green.

The same vertical lines that gardeners are looking for when they plant grasses may be provided by irises. There are several handsome two-tone forms, although only two appear to be sold in the United States, at least according to the catalogs I've seen. Someday soon perhaps an enterprising nursery will offer *Iris laevigata* 'Variegata', or the yellow and green form of *I. pallida*, or the green and cream form of *I. foetidissima*. You can buy the green and white *I. pallida* 'Variegata', and the yellow and green form of *I. pseudacorus*, the tall swamp lover with yellow flowers. The contrasting markings on this plant last only through spring, however.

Variegated shrubs seem to occur in almost every genus, from the wide-leaved evergreen shrubs such as leucothoe, pieris, holly, boxwood, and euonymus to the narrow-leaved juniper, hemlock, arborvitae, and chamaecyparis.

As I look through books and catalogs I learn that old familiar shrubs such as deutzia and abelia now come in variegated forms. Weigela too, and cotoneaster. I'm toying with the idea of trying a *Hydrangea macrophylla* 'Mariesii Variegated' or 'Tricolor', but I know I might lose it in a hard winter. The catalog pictures have been



PHOTOS BY MICHAELS THOMPSON

Top: *Hydrangea macrophylla* 'Tricolor' has variegated foliage and lace-cap flowers that are blue to pink according to the acidity of the soil. **Left:** *Iris pallida* 'Variegata' has distinct green and white striped foliage.

tempting me for a long time, even though I know better than to believe in photographs.

While the narrow-leaved evergreens can be grown both North and South, those of us who live where the thermometer drops below zero have to forego many of those with broad leaves, such as variegated holly, pittosporum, or osmanthus, and *Acuba*, which can be so effective against a dark background. However, we Northerners can have a *Pieris japonica* with white edges, as well as variously edged and splotched evergreen *Euonymus* that come as upright shrubs or in a sprawling form that can be trained as a shrub, vine, or ground cover. One of the latter type, *E. fortunei* 'Coloratus', has leaves with red and purple areas, and is the one frequently used as a ground cover by landscape designers.

There is a much-prized version of *Daphne* × *burkwoodii*, 'Carol Mackie', with gold borders on its tiny leaves. All the passionate gardeners I know either have it or wish they did. I much prefer my plain green *D. × burkwoodii* 'Somerset'. Even variegated plant freaks, you see, do not fall for all of them. Some of the plants look

fresh, harmonious, dramatic, distinguished, and others merely speckled, indecisive, hectic—I might even add sick. All, I suppose, depends on who is looking at them.

Of the deciduous variegated shrubs, I have only two—the old green and cream dogwood sold as *Cornus alba* ‘Elegantissima’ and a single-flowered *Kerria japonica* ‘Picta’, whose slender pointed leaves are decorated with white. It’s an airy, delicate thing, never rising above three feet, making it a good candidate for a mixed border. The dogwood is taller, more robust, very pretty, and would also be good in a border if it didn’t form mats of surface roots and stolons. There is another *Cornus alba* called ‘Gouchaultii’, whose foliage is described as being green, creamy yellow, and rose. In winter, all *C. alba* dogwoods have red, varnished branches whose color can be renewed by cutting several of the stoutest to the ground very early in spring.

I have taken a chance on three variegated vines. The first, a Japanese honeysuckle (*Lonicera japonica* ‘Aureo-reticulata’) with fine yellow webbing patterned on its round leaves, is still too small to be judged. But after three years, my very expensive *Actinidia kolomikta* had made only the most offhand attempt to live up to what was expected of it. I’d been mooning over pictures and descriptions of it for several years, as who would not upon reading from Christopher Lloyd that “its heart-shaped leaves, which are purplish on their first appearance, can then develop vivid pink and pure white bands. Working from the tip backwards, you will first get a white area, then pink and then (if any of the leaf remains) green.” Sometimes, Lloyd goes on, plants fail to perform and no one knows why. On the other hand, they have been known to climb to the top of two-story buildings in Sweden.

Mine, planted against a tool shed in New York, grew many solid green leaves the first summer. The second summer, as I rounded the corner of the shed on my riding mower, I very nearly capsized from the joyful shock of seeing a wide white band and a touch of pink on one of its leaves. Ha, thought I, it’s got the idea and is on its way! But no such thing. That was that for the summer. The fourth summer finally produced the long-awaited foliage in white, pink, and green. Patience, apparently, is required.

This vine is planted against the weathered gray boards of an old shed and next to it there is an uninhibited specimen of a shrub rose called *Rosa* ‘Ballerina’, whose



large sprays of small, single pink, white-centered flowers are displayed continuously during the summer. The pink of the rose is almost identical to that in the *Actinidia* leaves, so the combination looks to have been perfectly planned. I don’t tell approving visitors that it was an accident.

My third vine is a variegated porcelain berry, *Ampelopsis brevipedunculata* ‘Elegans’, which, I have just learned, will die to the ground in winter. Let us hope it resurges, for it is indeed extremely elegant with twists and curls of fine rosy thread and, along the points of its ivylike leaves, soft hints of white. I had to keep watch over it last summer, as the Japanese beetles attack porcelain berry relentlessly.

I have news for those people who, like me, thought that real trees had green leaves, or at the most red, as in the case of the small Japanese maples, some Norway maples, and purple beech. There is *Liriodendron tulipifera* ‘Aureo-marginatum’, a tulip tree with yellow margins on its leaves; beech trees with leaves edged in pink, white, or yellow or, in the case of *Fagus sylvatica* ‘Tricolor’, marked with purple, pink, and cream all at once. You can buy a Norway maple with white edges, a variegated oak, and dogwood trees with white variegations (*Cornus florida* ‘Welchii’) or yellow (*C. florida* ‘Cherokee Sunset’ or ‘First Lady’). As I write this, no doubt more new forms are being born.

The greatest range of leaf forms and colors is offered by the Japanese maple, *Acer palmatum*. Most have Japanese names and each sounds more intriguing than the last. But if I had a place to put it and a movable greenhouse with which to cover it in the winter, I’d buy ‘Butterfly’. In



Top: The white-edged leaves of *Cornus florida* ‘Welchii’ turn bronzy purple with a deep rose edge in the fall. **Above:** *Pulmonaria* ‘Roy Davidson’ features dramatic silver-spotted leaves.

the picture I’ve seen it is beautiful enough to bring tears of longing to the eyes. Unfortunately—or perhaps fortunately—for me, many of them won’t tolerate temperatures colder than 12 degrees and most not less than 3 below zero. Otherwise I might want to buy half a dozen and redesign my whole garden around them.

Elisabeth Sheldon is the author of A Proper Garden.

SOURCES

For sources of any of the plants mentioned in this article, call AHS’s Gardeners’ Information Service at (800) 777-7931 from 11 a.m. to 3 p.m. EST, Monday through Friday.

Attainable Chimeras

*A clear explanation
of leaf variegation
eluded botanists for
a century.*

STORY AND PHOTOS
BY ROBERT GENEVE

Dictionaries say that chimeras are illusions or unrealizable dreams. But having a chimera in your garden is easy; chimeras are also genetic mutations, of which variegated plants are the most common example.

Defining a botanical chimera—pronounced ky-MIR-uh—is more difficult. I wanted to use a definition that was simple and crystal clear. A definition that didn't contain technical jargon. My first attempt wasn't very satisfying:

"A chimera is a plant with a composite of two or more genotypes in the cell layers that make up the shoot apex."

This, I realized, would leave readers feeling a bit like Alice reading the first verse of Lewis Carroll's wonderful nonsense poem, "Jabberwocky." When Alice discovers that the poem is in looking glass letters, it still doesn't help her understand the apparently meaningless verse. The definition of a plant chimera states that "a chimera is a plant with a composite of two or more genotypes in the cell layers that make up the shoot apex." The definition is accurate and succinct, but as for clarity, it may as well stay in looking glass letters. It does very little to explain the phenomenon behind the enchanting leaf pattern that transforms the green leaf of *Hosta sieboldiana* into the attractive yellow-edged leaves of the cul-



Sectorial chimeras give plant parts a striking "half-and-half" appearance. Most, like that in this cyclamen, are unstable and revert to a solid color.

tivar 'Frances Williams'. In order to better understand how a plant chimera originates and becomes a stable plant form, we'll need more than a simple definition.

At first glance, even the term "chimera" seems an intimidating and unfortunate choice. But the circumstances that led Hans Winkler to select this name in 1907 take us through some interesting turns in botanical history and illustrate the impact chimeras have had on plant science, and in particular, early plant anatomy. Winkler borrowed the term from Greek myth, in which a chimaera was the mythical fire-breathing beast with the head of a lion, the body of

a goat, and the tail of a dragon. The middle "a" was dropped to avoid confusion with a group of fish already called "chimaera." Now we use the term chimera to describe a plant composed of cells (or more usually, cell layers) that contain distinctly different genetic information.

The study of chimeras began quite by accident more than eighty years before Winkler gave them a name and for some time was pursued experimentally along an erroneous path. In 1825 at a French nursery owned by a Monsieur Adam, a so-called "graft hybrid" arose from a graft between a purple broom (*Cytisus pur-*

A CHIMERA, OR NOT A CHIMERA?

Which of our variegated garden plants have multicolored foliage as the result of chimeras?

Determining if a plant is chimeral can be difficult, and there is no reference text with a compendium of chimeral variegations. With that as a disclaimer, a simple rule of thumb for determining the presence of a chimera is to observe a plant's seed-generated progeny for variegation: Plants that retain the same colors after being grown from seed probably are not chimeras. However, the opposite will not always be the case.

For example, the variegation on pulmonaria is genetically controlled and is transmitted to subsequent seedlings. But cultivars, such as the *Pulmonaria* 'Roy Davidson' mentioned in Elisabeth Sheldon's article beginning on page 26, is no doubt a selected form with brighter pigmentation and must be propagated by divisions. The *Lamium* *galeobdolon* 'Herman's Pride' would be a similar case of pattern variegation.

An educated guess would indicate that among other plants in that article, *Goodyera*, *Chimaphila*, and *Erythronium* are the result of pattern variegation.

Known chimeras include the variegated examples of *Daphne*, *Cornus*, *Fagus*, *Kerria*, *Acer*, *Hosta*, *Polygonatum*, *Thymus*, *Mentha*, *Sedum*, *Salvia*, and *Iris*.

As for *Lamium* and *Houttuynia*, they are most likely chimeras.

—Robert Geneve

pureus) and a golden chain tree (*Laburnum anagyroides*). This particular graft had apparently been unsuccessful. It had shown no growth for a year when multiple buds began to arise from the area of the graft union, and one of these shoots combined visible traits of both the broom and the golden chain tree.

Propagated and sold as a novelty plant, it caught the eye of several scientists of the day, particularly those involved in genetics and evolution. Its appearance suggested that it was caused by the fusion of non-sexual cells from the two plants to form a true "graft hybrid"—an incredible genetic breakthrough. Charles Darwin was a proponent of this cell fusion theory, and in his 1868 book, *The Variation of Animals and Plants under Cultivation*, described the variation in the pealike flowers of this mutant plant. He was fascinated to observe individual blossoms from the same group of flowers, which could contain entirely yellow (from the golden chain tree) or entirely purple flowers (from the broom), both of which might be adjacent to single flowers in which exactly half was yellow and the other half purple.

Today's Latin name for this plant is *+Laburnocytisus adamii*. The plus sign and the combining of the two parent-plant genus names is the designation for a graft chimera as outlined by the *International Code of Botanical Nomenclature*. The species name commemorates the owner of the nursery where this plant originated.

The idea of nonsexual cell fusion, especially between two plants from different



The leaves of Bougainvillea 'Raspberry Ice' appear to represent a very complicated chimera, but its cell structure has never been studied.

genera, was an exciting concept, but not everyone in the late 1800s agreed that *+Laburnocytisus* was the result of cell fusion. In 1907 Hans Winkler approached this problem experimentally by grafting back nightshade (*Solanum nigrum*) onto tomato (*Lycopersicon lycopersicum*). After the graft union had formed, Winkler cut off the top of the nightshade, leaving a pyramidal wedge of its tissue embedded in the tomato stem. When he examined its anatomical features closely, it was clear that at the graft union, the cells of the two plants retained their independent characteristics. They had not fused, but were mixed together like pepper and salt. Likewise, some of the shoots that formed at the cut surface of the graft union were

composed of distinct populations of cells from both the nightshade and the tomato. Winkler termed this combination a "graft chimera" because it reminded him of the composite beast from Greek mythology.

It was botanist Erwin Baur who first applied the concept of chimeras to plants with variegated leaves. In 1909, studying seedlings of a variegated geranium (*Pelargonium*) popularized under the name 'Freak of Nature', Baur saw a link between their green and white leaf pattern and the mixed population of cells Winkler described in his graft chimera. Baur recognized that the geranium's white leaf margin was the result of these outer cell layers containing nonpigmented cells. He coined the term "periclinal chimera" to describe plants having a thin outer layer of cells that differ genetically from those cells in the inner core. "Periclinal" is derived from Greek for "surrounding." Three-dimensionally, the two layers are often described as a hand in a glove or skin over a core.

This concept underlies all of the subsequent studies on chimeras. It also resolved the conflict between "graft hybrid" versus "graft chimera." Baur suggested that *+Laburnocytisus* had an outer shell of *Cytisus* over inner layers of *Laburnum*, a theory confirmed by subsequent elegant experiments by other researchers looking at chemical differences in the cells of *Cytisus* and *Laburnum*. The fusion of nonsexual plant cells would have to wait until the 1970s, when scientists would successfully fuse protoplasts—cells with the cell wall removed—using sophisticated tissue culture techniques.

Since Baur's day, other researchers working with *+Laburnocytisus*, other graft chimeras, and variegated leaf chimeras have concluded that there are two to four (usually three) distinct layers of cells involved in chimera formation, and that these layers can be identified in the shoot apex—the microscopic growing tip of a shoot. In 1941, S. Satina and A. F. Blakeslee suggested that chimeras be described on the basis of the genetic composition of the cell layers of the shoot apex, and that the layers be designated as L-I, L-II, L-III, and L-IV, with L-I the outermost "skin," and the highest number the innermost layer or core.

Variegated leaf chimeras are described with letters indicating the colors of these cell layers beginning with L-I. In monocots—that group of flowering plants that includes grasses, sedges, lilies, and irises—the most common form of variegation is

WG. The outer layer of cells is white and the inner layer green. Many cultivars of *Hosta*, a member of the lily family, show this type of variegation, in which the leaf's edge is white and the center green, or the opposite pattern, GW, in which the edge is green and the center white. In monocots, usually the outer, or L-I layer, controls the color of the leaf edge.

The most common form of leaf variegation in a dicot species, which includes most of our familiar broad-leaved plants, is GWG. The outer and inner layers of cells are green, and the middle cell layer is white. But in most dicots only the middle layer of cells contributes to the outer edge of the leaf, so the leaf will be green with a white outer margin. The variegated red osier dogwood (*Cornus stolonifera*) is a GWG. A GYG, such as the variegated holly, *Ilex aquifolium* 'Aureo-marginata', will be green with a yellow outer edge.

While these are the most common chimeral patterns, they aren't the only ones. One interesting exception is the group of plants called "ever-sports." One of these is the spirea, *Spiraea × bumalda* 'Anthony Waterer', a dicot with a WGG pattern. Normally, because the middle layer of cells is green, this cultivar's leaves are solid green. But occasionally a stem will spontaneously "sport" or mutate. Unstable cell divisions in the outer layer cause these white cells to "invade" the middle or even inner layers, leading to a WWG or WWW pattern, so that white shoots appear on the spirea. Ever-sporting explains the most common forms of variegation found in gymnosperms, like pines and junipers. Examples of this type of chimera are found in the common narrow-leaf evergreens, such as *Juniperus horizontalis* 'Variegata' or *Chamaecyparis pisifera* 'Albo-marginata'.

The white outer cell layer of an ever-sport is like a family secret that suddenly makes headlines overnight. A reversion is a slower phenomenon, which outwardly has the opposite effect: a prized variegated-leaved plant gradually reverts to all green. This occurs because a chimeral arrangement in a cultivar is relatively unstable, and cells from one layer may invade another. This is quite common on variegated forms of *Euonymus*, and results in their variable pigment patterns. A variegated leaf or branch may convert to solid green through "replacement" of an inner layer of cells by those from an outer layer (converting a GWG pattern in a dicot



Above: The needles of the dragon's-eye red pine are one of the few examples of a fairly stable sectorial chimera. Left: Hosta 'Crispula' shows the most typical periclinal chimera pattern for a monocot species, WG—a white outer layer of cells and a green inner layer.

to a GGW pattern, for instance). In "displacement," cells move in the opposite direction: a cell from an inner layer displaces cells in an outer layer (converting a WGG to a GGG). In cases where a variegated leaf pattern reverts to an all-green, nonchimeral leaf through displacement, the all-green stem is often more vigorous and can quickly overgrow its chimeral counterparts. For that reason, gardeners should vigilantly remove these renegade shoots.

Different from the "hand in glove" arrangement of the periclinal chimera is the sectorial chimera, which was also first described by Baur in 1909. In this case, a "sector" consisting of one-third to one-half of all three layers of the entire shoot apex will contain only mutant cells. The result is a stem that is half white or yellow and half green. This leads to the striking appearance of *Kerria japonica* 'Kin Kan', or the spectacular alternating segments of green and white on the needles of the dragon's-eye red pine (*Pinus densiflora* 'Oculus Draconis'). These are fairly stable sectorial chimeras;

most tend to revert spontaneously to periclinal chimeras or nonchimeral forms.

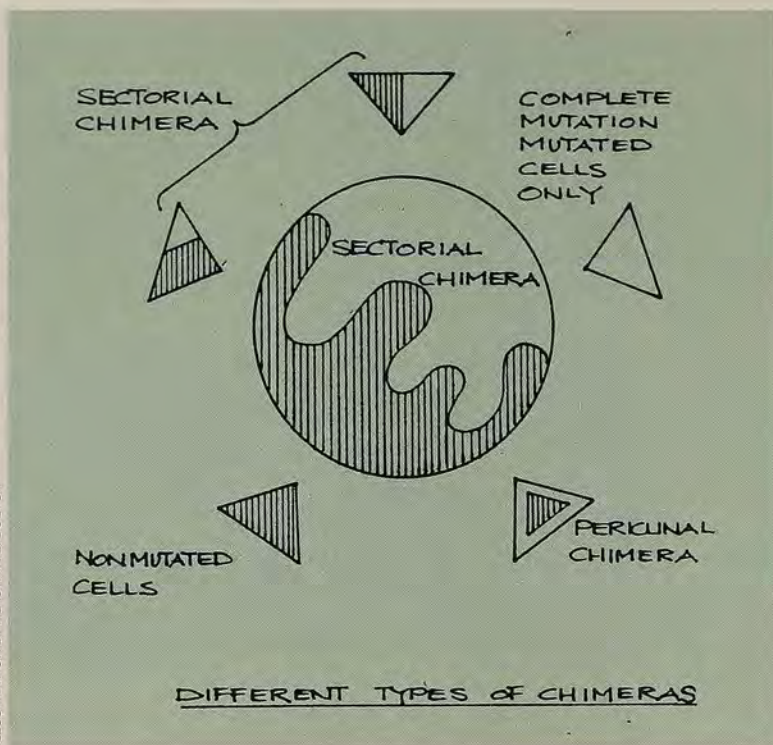
Of course, variegated pigment chimeras are not found only in leaves. A chimeral pattern can often be seen in the flowers of vegetatively propagated ornamentals with nonvariegated leaves, including geraniums, carnations, chrysanthemums, and cyclamens.

The most extensively studied type of flower chimera is that found in the 'William Sim' carnation (*Dianthus caryophyllus* 'William Sim'). Only the outer and second cell layers are involved in the formation of carnation flowers, and flower color is controlled only by the outer layer. The red-flowering form of this carnation has a RR arrangement, while the white-flowering form has a WR cell arrangement. Red flecks or streaks occasionally occur in the white form as a result of cells from the red layer randomly "invading" the white outer layer during flower formation.

Another example of periclinal chimeras is the pink or variegated bracts of poin-

Far right: Leaves from *Euonymus fortunei* 'Emerald 'N Gold' showing from top, 1) fully displaced leaf is GGG; 2) desired leaf is GYG; 3) YYG, after first replacement—green in center is derived from innermost cell layer; 4) unstable sectorial chimera will soon be fully replaced to YYY; 5) all-yellow leaf results from full replacement of cells from GYG to YYY.

ILLUSTRATION BY ALASTAIRE BOLTON



settias. In this case, rather than one cell layer controlling color, one layer may show through another. Pink poinsettias have a WRR cell arrangement. The red inner layers appear pink through the white outer layer of cells. More typical in appearance for a chimera are those with a WWR pattern. These are white with a pink edge; the outer and middle layers of cells are responsible for the white, center portion of the bract, and the middle and inner layers of cells together are responsible for the pink edge. The same WRR pattern is present in the novelty poinsettias that have pink bracts with red streaks. But in this case, the chimeral arrangement is unstable; during bract development, cells from the red center layer have randomly moved into the outer layer to produce what appear as solid red (RRR) islands in the pink bract.

The complicated nature of chimeras is illustrated by *Bougainvillea* 'Raspberry Ice'. Its cell make-up has never been studied, but it is apparent that different cell layers participate in the formation of its leaf. The green and white foliage is sometimes touched with red, and in places, a green layer shows through a white layer.

It shouldn't be assumed that all variegation is the result of a chimera. When variegation occurs in seed-propagated plants—as it does in the flowers of the bicolor picotee-type petunias and the foliage of coleus—it is the result of so-called "pattern" variegation. All of the cell layers in these plants have the same genetic makeup. Genes in the nucleus of each cell determine whether a given cell will produce

pigment. That is why these variegated plants can be produced from seed.

It can be very difficult to tell whether variegation has been caused by chimeral or pattern variegation, even for scientists working in this area. Apparently some *Coleus* may be chimeral, and there has been some confusion concerning the chimeral origin of some African violets (*Saintpaulia* spp.). And there is yet a third cause for the multicolored petals of tulips and the leaf variegation of *Abutilon*, which result from a viral infection.

Another type of periclinal chimera, involving mutations in the outer layer of cells or epidermis of a plant part, can result in variation in overall color, thorniness, or hairiness. Several of these have given rise to important horticultural cultivars.

A mutation in the pigment of the 'Burbank' potato induced the "russeted" appearance of one of the most important commercial potatoes, the 'Russet Burbank'. The 'Delicious' apple was selected from a seedling found in 1895, but one with an entirely red skin did not occur until 1925, as the result of a chimeral epidermal mutation. Since then, there have been about twenty-five more chimeral mutations for red pigment in the 'Delicious' apple, and several of these account for the cultivars that are commercially important today. The 'Bartlett' pear mutated in 1938 to give rise to a red-skinned pear grown commercially as 'Max Red Bartlett'. Chimeral mutations have also helped make substantial improvements in grapes, day-lilies, and fuzzless peaches or nectarines.

The latter have been cultivated for more than 2,000 years.

For anyone who has pruned thorny blackberries, the chimeral mutation for a thornless epidermis is a pointed example of an epidermal mutation—in this case, a mutation has produced an outer layer devoid of thorns. But this apparently beneficial mutation, as a result of its chimeral arrangement, exhibited several inherent problems. While the outer layer was thornless, the middle and inner layers retained unexpressed thorny genes. Because blackberry plants sucker by producing shoots from their roots, and these suckers arise from the middle and inner cell layers, the shoots were thorny. And because the thorny middle layer is the source of male and female germ cells, these chimeral thornless blackberries couldn't be used in a breeding program. In 1983, two scientists named Ken McPheeters and Robert Skirvin solved the problem with tissue culture, producing blackberry plants from only the thornless outer layer of cells.

The significance of chimeras to the ornamental and fruit industries of horticulture has grown substantially from the first, curious observations of oddities like *+Lamburnocytisus* or Baur's 'Freak of Nature' geranium. Chimeras need no longer be a mystery. It's simple enough: "A chimera is a plant with a composite of two or more genotypes in the cell layers that make up the shoot apex."

Dr. Robert Geneve is associate professor of horticulture at the University of Kentucky.

The American Beech

This giant's bark begs to be written upon; its nuts were a favorite of the ill-fated passenger pigeon.

BY SUSAN SAND

Early colonists of America arrived in a new world rich in native flora, with pristine climax forests of magnificent trees. Among them was the American beech (*Fagus grandifolia*), some of them 300 to 400 years old with trunks up to four feet wide and rising 120 feet above the forest floor. It reached its greatest size in the rich bottomlands of the Ohio and lower Mississippi River valleys, and along the western side of the southern Appalachian Mountains. But it was plentiful almost everywhere in Colonial America; early settlers found forests of American beech covering large areas of Kentucky, Indiana, Ohio, and central Michigan. However, the pioneers quickly learned that the presence of beech indicated good soil, since they grew in deep rich loam, and, especially in the Ohio River valley, the American beech fell to make way for the plow.

The only beech native to the United States, *F. grandifolia* is still one of the most widely distributed eastern North American trees, with a native range extending from Nova Scotia to northern Florida, and from the East Coast to the eastern edges of Wisconsin, Missouri, and Texas. This noble tree with graceful lines and smooth gray bark is often found with white pine and Canadian hemlock, or with birch, sugar maple, and other hardwoods. It may also form pure stands, and in the South it inhabits stream bottomlands and the borders of swamps. The sun does not penetrate a beech wood, for the trees dominate by casting heavy shade and filling the upper layer of soil with their shallow root sys-



The American beech's golden bronze autumn leaves, especially those on the lower part of the tree, often cling to the branches into winter.

AL BUSSEWITZ, PHOTONATS



The color of the the beech's smooth bark has been compared to "old aluminum." Here it picks up the golden glow of autumn sun.

tems. Although it keeps its branches to the ground when growing in the open, in the forest it is branchless for half its height of seventy to 120 feet.

The unmistakable bark of the American beech, which has been described as pale like the bloom on old aluminum, does not wrinkle with age. The cambium remains very near the surface and the bark almost invites the inscription of messages. Indeed, the Indo-Europeans who entered Europe from Asia brought with them the custom of inscribing the smooth trunks of beech. The association of beech with writing is even documented in the origin of the English word "book," which was derived from the Anglo-Saxon *boc*, meaning "character" or "letter"; *boc* had originated from *beece*, the Anglo-Saxon word for beech. These words in turn derived from

the Sanskrit *boko*, meaning "letter" or *bokos*, meaning "writings."

This tree must have looked familiar to colonists from Europe, for the European beech (*F. sylvatica*), similar in appearance, had long been the general utility hardwood of Europe, providing food, fuel, building material, furniture, tool handles, wooden shoes, and numerous utensils. But while people in Europe considered it the best hardwood available, the settlers in America soon found other trees superior to beech in strength, hardness, beauty, and size of their timber. And because the beech was difficult to split and decayed when exposed to the elements, the pioneers had little use for it as fencing material.

Nevertheless, its durability and resistance to decay under water made it ideal for water wheels, and during the mid-

eighteenth century it was valued for making charcoal. Its dark red to pinkish brown wood—moderately hard, strong, fine grained, and able to take a high polish—was used for cabinet work, tool handles, and hewn timber. Although not as dense as hickory or oak, beech was also valued as a fuel wood. It proved especially useful for items requiring a wood that imparts no taste, such as cutting boards, butcher blocks, picnic plates, ice cream paddles, and hogsheads for molasses and sugar.

Even the dry leaves were useful, for stuffing mattresses. An 1862 journal extolled their virtues, claiming: "The leaves of the beech trees, collected at autumn, in dry weather, form an admirable article for filling beds. The smell is grateful and wholesome; they do not harbor vermin, are very elastic, and may be replenished annually without cost."

Not only has its wood had many uses, but the nut of the American beech is valuable as food and fodder. One to three small triangular light brown nuts develop within a small bur with a downy lining and an outer covering of recurved prickles. The sweet, nutritious nuts are responsible for the tree's generic name *Fagus*, from the Greek *phagein*, meaning "to eat." (*Grandifolia* is a reference to the large leaves.) Considered one of our most flavorful forest products, the nuts are ready to gather after falling to the ground in late October or November.

Both Native Americans and settlers used beechnuts in foods. The Potawatomi roasted and pounded them into a flour, the Iroquois put the meat of the nut in corn soup, and many others used them fresh or stored them up for winter food. Some city dwellers apparently appreciated their taste as well; E. Lewis Sturtevant, in his "Notes on Edible Plants," reported that beechnuts could be found in Boston markets at the end of the nineteenth century.

Indians and pioneers relied mainly upon edible wild plants for making beverages, and beechnuts provided a coffee substitute. The husked nuts were roasted, shelled, dried, ground, and stored until ready to use. One teaspoon per cup was then measured, covered with boiling water, simmered fifteen minutes, and strained.

Today the seeds, collectively called mast, are used primarily as animal fodder. Early settlers fed them to their hogs and turkeys. They were said to give a finer flavor to pork; razorback hogs were fed a mixture

of beechnuts, acorns, and chestnuts. Beechnuts also nourish forest wildlife, including white-tailed deer, squirrels, raccoons, black bear, wild turkeys, ruffed grouse, chipmunks, and deer mice.

But perhaps the American beech's most unique association was with the passenger pigeon, to which, said naturalist Donald Culross Peattie, it "played lavish host." John J. Audubon wrote that the apparent migration of these birds, by the million, was actually a search for the beech's rich harvest. Great flocks would circle above the trees, alight upon the ground, and industriously throw up the fallen leaves in search of the seed. The passenger pigeons would also roost in beeches at night. They came in such great numbers that the noise reminded Audubon of "a hard gale at sea passing through the rigging of a close-reefed vessel." So many birds would land on one tree that they would form "solid masses as large as hogsheads" on the branches, which occasionally fell under the weight and crashed to the ground, killing hundreds of birds underneath. In an area of forest that looked as if a tornado had swept through, Audubon once observed that beech trees two feet in diameter had succumbed to the weight of these great masses of birds.

The fates of both tree and bird were interwoven. The beech was cut to create farmland and the passenger pigeon was pushed to extinction, as much by the loss of beech mast as by the massive slaughter of its flocks. The last wild passenger pigeon is believed to have been killed in 1900; the last in captivity died fourteen years later.

Interestingly, it has been found that another bird, the blue jay, is instrumental in reforesting beech, planting its seeds even more efficiently than the human forester.

Beech seeds need the help of animals or people for their dispersal. Because they are heavy, they remain under the crown of the parent tree, where the seedlings will not grow well in the dense shade. A recent study found that blue jays carry three to fourteen beech seeds at a time, flying as far as two and a half miles, and following wooded fence rows to avoid predators. Birds in the study selected only sound nuts: 88 percent of those recovered germinated under laboratory conditions, compared to only 11 percent of the nuts produced by the trees.

Another aspect of the blue jay's efficiency was recognized more than thirty years ago. These birds are highly skilled at spac-



Above: The pest-free foliage is pale green in spring and becomes blue-green in summer. Below: The prickly four-part pod contains the tasty nuts.

ing the seeds as they hide them, usually in soil or pine needles. They never put several seeds together, and occasionally even plant them in rows. As a result, seedlings sprout at proper planting distances, and tend to be healthier. Now that human settlement has dissected ecosystems that were once continuous, the blue jay's efforts may be the primary method for dispersing beech seeds to new areas.

Planted by jays or by chance, the American beech may not always find an ideal home, since it becomes massive with age. But given enough space, it is well worth planting, preferably balled and burlapped and in the spring. Beech is tolerant of shade, but prefers full sun and requires a loose, moist, but well-drained acid soil. The dense shade of its low branches and the shallow, fibrous root system make it



difficult to grow grass around a beech; however, if the low-hanging branches are maintained, no ground cover is necessary. American beech offers attractive pest-free foliage of pale green in spring, becoming blue-green in summer, turning golden

PHOTOS BY AL BUSSEWITZ; PHOTONATS

TALL TALE ON A TALL TREE

A famous American was following the ancient custom of inscribing beech bark when he carved his message in a 200-year-old American beech on Carroll Creek in northern Tennessee.

D. Boone
cilled A BAR

On Tree
in thE yEAR 1760

Approximately six feet above the ground on the east side of the tree, Daniel Boone's message was legible until about 1880, according to a 1915 article in *American Forests* by Forest Examiner Wilbur R. Mattoon. Natural growth and numerous later inscriptions eventually obscured the writing. In 1915 the bark was searched carefully for old dates, revealing a shallow but unmistakable "1815." Since the dates of 1862 and 1868 were even more clearly readable, it was concluded that beech can retain bark incisions for a full 100 years, making it plausible that Boone's inscription could have survived in legible form from 1760 to 1880. It was also conjectured, however, that Boone's friends could have cut the message into the tree at a later date.

When this careful inspection was made, the famous beech tree was occasionally being subjected to strong wind pressure because most of the forest tract around it had been cut for timber. Daniel Boone's tree was already leaning at an angle of 30 degrees. Furthermore, grazing had removed natural cover and allowed erosion to expose surface roots. At the age of approximately 365 years, the tree finally succumbed in 1916, when it was about eighty-five feet tall and over two feet in diameter. Just a seedling in 1551, it would have been sixteen inches in diameter when Boone carved his message.

bronze in autumn, and often clinging to the tree into winter, especially on the lower branches. Even in winter beech is beautiful, for its smooth, steel gray bark—often mottled with darker bands and blotches—extends from a sturdy trunk to delicate branches. A long-lived, stately tree, American beech is lovely throughout the seasons and majestic with age. It merits planting as an impressive gift to future generations.

Susan Sand has a master's degree in horticulture and is a horticultural and biology instructor at Damascus High School in Damascus, Maryland. This is the second in a series of tree histories by Sand.

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Woodlander's Inc., 1128 Colleton Avenue, Aiken, SC 29801. Catalog \$1.



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Plant Hunting. Giants Not Yet in History Books. Dec., 20; Himalayan Journal, Updated. Apr., 10; John Creech: Bringing Back Asia's Best. Dec., 16.

Plant Profiles. Cornelian Cherry—Pretty and Tasty. Feb., 39; Eagle and the Dove, The. Apr., 22; Elegant Echeverias, The. Dec., 23; Hanashobu: The Romantic Japanese Iris. Apr., 34;



Hemerocallis littorea, December.

Houttuynia: Many Colors, Many Uses. Dec., 30; Landscaping with Roses: New Shapes for New Uses. Jun., 24; Moragne Plumerias, The. Apr., 16; Plant with Wings, A. Aug., 18; Proven Performers—Orchids, Bamboos, Begonias. Feb., 25; Quest for Cold-Hardier Azaleas, The. Apr., 28; Some Enchanted Evenings. Aug., 16; Tree History, A: The American Beech. Dec., 37; Tree History, A: The Osage Orange. Oct., 37; Where Have All the Chrysanthemums Gone? Aug., 30.

Plant Societies. Proven Performers. Feb., 25.



Begonia 'Looking Glass', February.

Plumerias. Moragne Plumerias, The. Apr. 16.

Prairies. Restoring Our Tallgrass Prairies. Oct., 10.

Purple Martins. Garden for Purple Martins, A. Jun., 36.

Restoration. Restoring Our Tallgrass Prairies. Oct., 10.

Roses. Landscaping with Roses: Comely Companions. Jun., 29; Landscaping with Roses: New Shapes for New Uses. Jun., 24.

Schulenberg Prairie. Restoring Our Tallgrass Prairies. Oct., 10.

Seed Savers Exchange. Saving Seeds for Home Gardeners. Jun., 42.

Shrubs. Landscaping with Roses: Comely Companions. Jun., 29; Landscaping with Roses: New Shapes for New Uses. Jun., 24; Natives Out of the Woods. Jun., 18; Quest for Cold-Hardier Azaleas, The. Apr., 28.

Tissue Culture. Recipes for Natives. Feb., 18.

Trees. Cornelian Cherry—Pretty and Tasty. Feb., 39; Natives Out of the Woods. Jun., 18; Tree History, A: The American Beech. Dec., 37; Tree History, A: The Osage Orange. Oct., 37.

Variegated Plants. Attainable Chimeras. Dec., 33.; Houttuynia: Many Colors, Many Uses. Dec., 30; Variety of Variegates, A. Dec., 28.

Walt Disney World Resort Complex. Florida Follies. Dec., 10.

PRONUNCIATIONS

Abutilon uh-BEW-tih-lon
Acer palmatum AY-ser pal-MAY-tum
Actinidia kolomikta ak-tih-NID-ee-uh
 kol-oh-MIK-tuh
Acuba uh-KEW-buh
Aeonium ee-OH-nee-um
Ajania pacifica uh-JANE-ee-uh
 puh-SIF-ih-kuh
Ajuga reptans uh-JEW-guh REP-tanz
Alocasia al-oh-KAY-see-uh
Aloe striatula AL-oh stry-AY-tew-luh
Ampelopsis brevipedunculata
 am-peh-LOP-sis
 brev-ih-peh-dunk-yew-LAY-tuh
Andropogon scoparius an-dro-POE-gon
 sko-PAIR-ee-us
Aquilegia ah-kwi-LEE-jee-uh
Arabis ferdinandi-coburgi AIR-uh-bis
 fer-dih-NAHN-dee-koe-BUR-gee
Aruncus astilboides ah-RUN-kus
 uh-stil-BOY-deez
Astrantia major uh-STRAN-shee-uh
 MAY-jor
A. maxima A. MAKS-ih-muh
Begonia bee-GOAN-yuh
Betula platyphylla var. *japonica*
 BET-yew-luh plat-ih-FIL-luh var.
 juh-PON-ih-kuh
Bougainvillea boo-gin-VIL-ee-uh
Brugmansia suaveolens
 brewg-MAN-see-uh swah-vee-OH-lenz
Caladium kuh-LAY-dee-um
Callicarpa americana kal-ih-KAR-puh
 uh-mer-ih-KAY-nuh
Camellia lutchuensis kuh-MEAL-yuh
 lew-chew-EN-sis
Carex morrowii KAY-reks mor-ROW-ee-eye
C. morrowii var. *expallida* C.
 mor-ROW-ee-eye var. eks-PAL-lih-duh
Cattleya KAT-lee-yuh
Chamaecyparis pisifera kam-ee-SIP-uh-ris
 pye-SIF-er-uh
Chimaphila maculata ky-MAF-ih-luh
 mak-yew-LAY-tuh
Chrysanthemum pacificum
 krih-SAN-the-mum puh-SIF-ih-kum
Coleus KOE-lee-us
Cornus alba KOR-nus AL-buh
C. florida C. FLOOR-ih-duh
C. stolonifera C. stow-lon-IF-er-uh
Cymbidium sim-BID-ee-um
Cytisus purpureus SIT-ih-sus pur-PEW-ree-us
Daphne × *burkwoodii* DAF-nee ×
 burk-WOOD-ee-eye
D. odora D. oh-DOOR-uh
Dianthus caryophyllus dy-AN-thus
 kare-ee-oh-FILL-us

Dudleya arizonica DUD-lee-uh
 air-ih-ZONE-ih-kuh
D. lanceolata D. lan-see-oh-LAY-tuh
D. pulverulenta D. pul-ver-yew-LEN-tuh
Echeveria agavoides ek-eh-VEE-ree-uh
 ah-gav-OY-deez
E. agavoides var. *multifida* E.
 ah-gav-OY-deez var. mul-TIF-ih-duh



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E. elegans E. EL-eh-ganz
E. gibbiflora E. gib-bih-FLORE-uh
E. harmsii E. HARMZ-ee-eye
E. × imbricata E. × im-brih-KAY-tuh
E. × mexecensis E. × meks-eh-SEN-sis
E. pulvinata E. pul-vin-AY-tuh
E. setosa E. see-TOE-suh
E. subrigida E. sub-RIJ-ih-duh
E. teretifolia E. tare-eh-tih-FOE-lee-uh
Echinops ritro EK-ih-nops RYE-troe
Epimedium ep-ih-MEE-dee-um
Erythronium americanum
 er-ih-THROE-nee-um uh-mer-ih-KAY-num
E. revolutum E. rev-oh-LEW-tum
Euonymus fortunei yew-ON-ih-mus
 for-TOO-nee-eye
Fagus grandifolia FAY-gus
 grand-ih-FOE-lee-uh
F. sylvatica F. sil-VAT-ih-kuh
Ficus pumila FYE-kus PEW-mil-uh
Freesia FREE-see-uh
Galium odoratum GAY-lee-um
 oh-duh-RAY-tum
Goodyera pubescens good-YER-uh
 pew-BES-enz
Graptopetalum grap-toe-PET-al-um
 × *Graptoveria* × grap-toe-VEE-ree-uh
Hakonechloa macro huh-kone-ee-KLO-uh
 MAK-roe
Heliconia hel-ih-KO-nee-uh
Helleborus foetidus hel-leh-BORE-us
 FET-ih-dus
H. orientalis H. or-ee-en-TAY-lis
Hemerocallis littorea hem-er-oh-KAL-iss
 lit-tore-EE-uh
Hibiscus schizopetalus hi-BIS-kus
 skiz-oh-PET-uh-lus
Hosta fortunei HOS-tuh for-TOO-nee-eye
H. sieboldiana H. see-bold-ee-AY-nuh
Houttuynia cordata hoo-TYE-nee-uh
 kor-DAY-tuh
Hydrangea macrophylla hy-DRAN-jee-uh
 mak-roe-FIL-uh
Ilex aquifolium EYE-leks ah-kwi-FOE-lee-um
Imperata cylindrica
 im-per-AY-tuh sih-LIN-drih-kuh
Iris foetidissima EYE-ris fet-ih-DIS-ih-muh
I. japonica I. juh-PON-ih-kuh
I. laevigata I. lev-ih-GAY-tuh
I. pallida I. PAL-ih-duh
I. pseudacorus I. sue-DAK-or-us
Juniperus horizontalis joo-NIP-er-us
 hor-ih-zon-TAY-lis
Kerria japonica KARE-ree-uh
 juh-PON-ih-kuh
 +*Laburnocytisus adamii*
 + luh-bur-no-SIT-ih-sus ah-DAM-ee-eye



CLASSIFIEDS

Laburnum anagyroides luh-BUR-num
an-uh-gih-ROY-deez

Lagerstroemia fauriei
lay-ger-STREE-mee-uh FAW-ree-eye

L. indica L. IN-dih-kuh

Lamiaeum galeobdolon lam-ih-AY-strum
gal-ee-OB-doe-lon

Lamium maculatum LAY-mee-um
mak-yew-LAY-tum

Ligustrum sinense lih-GUS-trum
sye-NEN-see

Liriodendron tulipifera
leer-ee-oh-DEN-dron too-lip-IF-er-uh

Lonicera japonica loh-NIS-er-uh
juh-PON-ih-kuh

Lycopersicon lycopersicum
ly-ko-PER-sih-kon ly-ko-PER-sih-kum

Magnolia mag-NOL-ee-uh

Mentha suaveolens MEN-thuh
swah-vee-OH-lenz

Miltonia mil-TOE-nee-uh

Miscanthus sinensis mis-KAN-thus
sye-NEN-sis

Molinia mo-LIN-ee-uh

Odontoglossum oh-don-toe-GLOS-sum

Pachyphytum pak-ih-FYE-tum

Pachysandra terminalis pak-ih-SAN-druh
ter-mih-NAY-lis

× *Pachyveria* × pak-ih-VEE-ree-uh

Paphiopedilum puh-fee-oh-PED-ih-lum

Parrotia persica puh-ROE-tee-uh
PER-sih-kuh

Pelargonium pel-are-GO-nee-um

Phalaenopsis fal-ee-NOP-sis

Phyllostachys nigra fil-oh-STAY-kiss
NYE-gruh

Pieris japonica PY-er-iss juh-PON-ih-kuh

Pinus densiflora PINE-us den-sih-FLORE-uh

Polygonatum commutatum
po-lig-oh-NAY-tum kom-mew-TAY-tum

P. odoratum P. oh-doe-RAY-tum

Pulmonaria officinalis pul-mo-NAY-ree-uh
oh-fis-ih-NAY-lis

P. saccharata P. sak-uh-RAY-tuh

Ratibida columnifera ruh-TIB-ih-duh
kol-um-NIF-er-uh

R. pinnata R. pin-NAY-tuh

Rhododendron occidentale
roe-doe-DEN-dron ok-sih-den-TAY-lee

R. pseudochrysanthum
R. soo-doe-krih-SAN-thum

Rosa ROE-zuh

Saintpaulia saint-PAUL-ee-uh

Salvia SAL-vee-uh

Schizachyrium scoparium
skiz-ach-EAR-ee-um sko-PAIR-ee-um

× *Sedeveria* × see-deh-VEE-ree-uh

Sedum spectabile SEE-dum spek-TAB-ih-lee

S. spurium S. SPEW-ree-um

Solanum nigrum so-LAY-num NYE-grum

Spiraea × *bumalda* spy-REE-uh ×
bew-MAL-duh

Tabebuia argentea tah-bee-BEW-ee-uh
are-JEN-tee-uh

Thelypteris noveboracensis the-LIP-ter-iss
nov-ee-bor-uh-SEN-sis

Thymus THYE-mus

Vinca minor VIN-kuh MY-nor

Xerophyllum asphodeloides zec-roe-FIL-um
ass-foe-del-OY-deez

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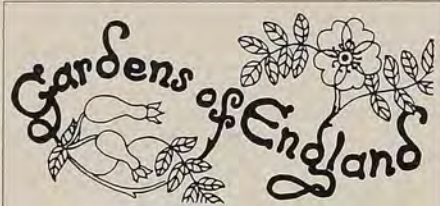
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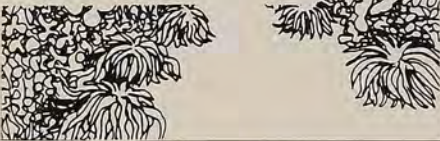
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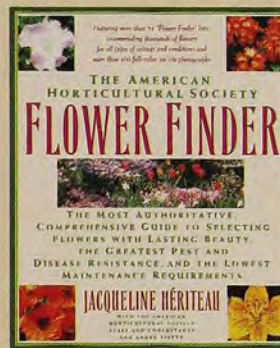
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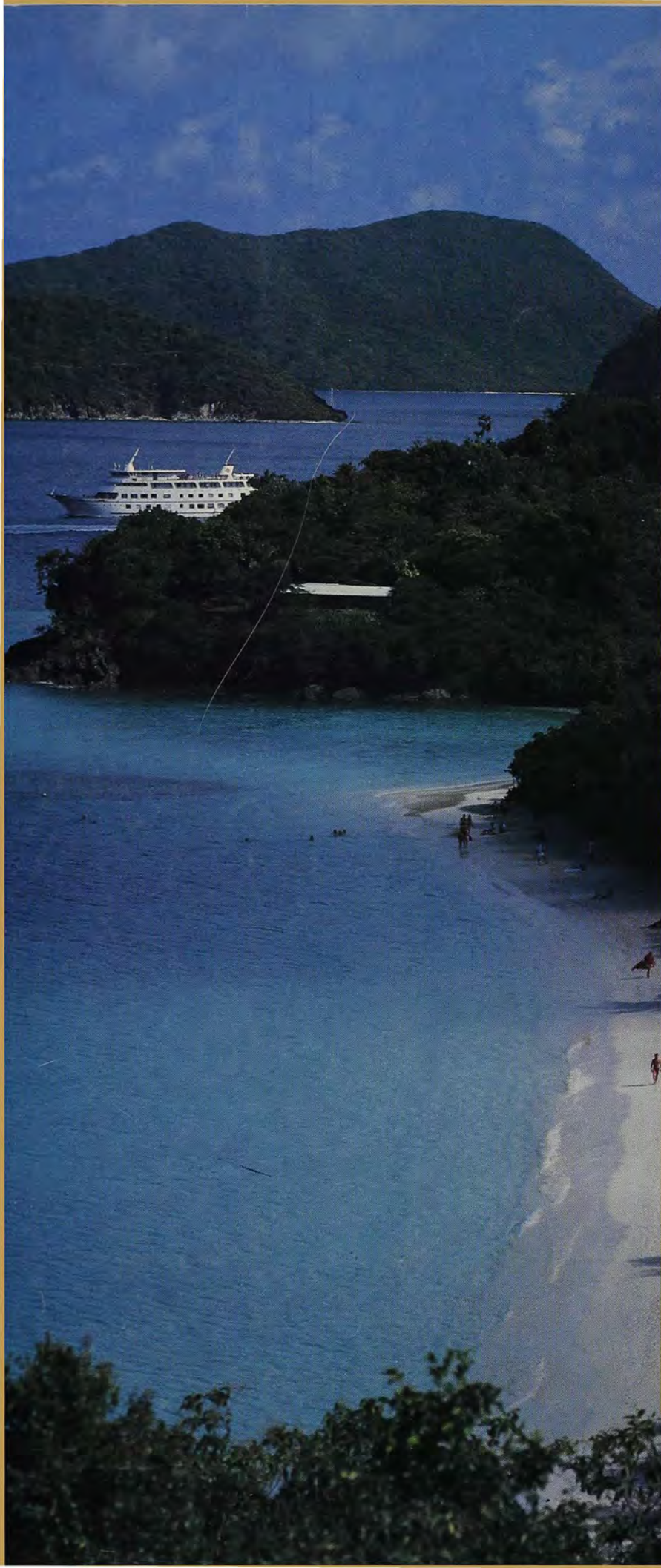
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This once-in-a-lifetime program, offered in connection with the Bermuda National Trust, will feature numerous private historic homes and gardens, where our hosts will be inviting us for special luncheons and dinners. Included in the program will be Ramsbury, Mount Pleasant, Orange Valley, Aberfeldy, Orange Grove, and Greenfield, home of Lt. Col. Sir Jeffrey Astwood and Lady Astwood, whose garden contains specimens of most every plant known to grow in Bermuda.

MAY 7-21, 1992 IRISH COUNTRYSIDE GARDENS AND THE ROYAL CHELSEA FLOWER SHOW

You are again invited to join BBC celebrity David Wilson on an exploration of the finest public and private gardens in the Republic of Ireland. The program of visits includes Glin Castle, Powerscourt Gardens, Lismore Castle Gardens, and a most unusual side trip to subtropical Inacullin Garinish Island. The program concludes in London for Members Day at the Royal Chelsea Flower Show.

JUNE 18-27, 1992 GARDENS OF THE COLORADO ROCKIES AND THE GRAND TETONS

Join Dr. William Gambill, former director of the Denver Botanical Garden, and Andrew Pierce, senior horticultural advisor of the Denver Botanical Garden, for a most unusual program that begins in Denver, Colorado, and concludes in Jackson, Wyoming. The itinerary includes private gardens, the Colorado Rockies National Park, Dinosaur National Park, the Grand Teton National Park, Yellowstone National Park, and a most exciting float trip on the Snake River.

Leonard Haertler Travel Company, 7922 Bonhomme Avenue, St. Louis, MO 63105, (800) 942-6666, (314) 721-6200 (in Missouri)

Members and friends of AHS will sail the Nantucket Clipper into Leverick Bay, a port of call on Virgin Gorda, during a January trip to the Virgin Islands.