

American Horticulturist

August 1992

A Publication of the American Horticultural Society

\$2.50

PARTNERS IN POLLINATION
FOSTER HOMES FOR RARE PLANTS
UNCOMMON ANNUALS
LIVING FENCES



RICHARD DYSART

Gardener, Actor



"Filming can take a lot out of you.

Gardening puts it back. Its rewards are many. Its bountiful

beauty nourishes my body and my soul.

My dad loved his garden. He introduced me to Miracle-Gro

many years ago. I've been using it ever since."

A handwritten signature in black ink that reads "Richard Dysart".



MIRACLE-GRO

American Horticulturist

Volume 71, Number 8

August 1992

ARTICLES

Sex Partners

by *Richard Devine* 12

The marriage between flowering plants and animal pollinators is full of passionate attraction and often, deceit.

Where the Wild Things Are

by *Jane Ware* 19

Propagating rare plants in botanical gardens may show how to preserve them in their native environments.

Barby Walls

by *Kathleen Yeomans* 26

Here are some sharp ideas for discouraging unwanted visitors to your home and garden.

Let's Hear It for Annuals!

by *Elisabeth Sheldon* 32

There's a world of one-season plants beyond marigolds and impatiens.

Taming the Texas Madrone

by *Marilyn Haddrill* 39

It survived the Ice Age and tolerates drought, but until recently, was thought too difficult to propagate for the garden.

DEPARTMENTS

Commentary 4

Letters 5

Offshoots 6

Book Reviews 9

Classifieds 42

Pronunciations 46



AUGUST'S COVER

Photographed by *Gwendolyn J. Brand*

Centaurea cyanus, the beloved cornflower, or bachelor's-button, brings a sapphire blue to the summer garden. Many of the truest blues, and certainly most of those that will bloom through the heat of late summer, can be found among annuals. The growing popularity of perennials has put annuals in the shade, but beginning on page 32, Elisabeth Sheldon urges us to take a fresh look at the many varieties that can be grown from seed.

American Horticultural Society

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

OFFICERS 1991-1992

- Mr. George C. Ball Jr.
President
West Chicago, Illinois
- Mrs. Helen Fulcher Walutes
First Vice President
Mount Vernon, Virginia
- Mr. Richard C. Angino
Second Vice President
Harrisburg, Pennsylvania
- Mr. Elvin McDonald
Secretary
Houston, Texas
- Mr. Gerald T. Halpin
Treasurer
Alexandria, Virginia

BOARD OF DIRECTORS

- Mrs. Suzanne Bales
Bronxville, New York
- Dr. William E. Barrick
Pine Mountain, Georgia
- Dr. Sherran Blair
Columbus, Ohio
- Mrs. Mary Katherine Blount
Montgomery, Alabama
- Mrs. Sarah Boasberg
Washington, D.C.
- Dr. Henry Marc Cabert
Washington, D.C.
- Mr. Russell B. Clark
Boston, Massachusetts
- Mrs. Beverley White Dunn
Birmingham, Alabama
- Dr. John Alex Floyd Jr.
Birmingham, Alabama
- Mrs. Julia Hobart
Troy, Ohio
- Mr. David M. Lilly
St. Paul, Minnesota
- Mr. Lawrence V. Power
New York, New York
- Dr. Julia Rappaport
Santa Ana, California
- Mrs. Flavia Redelmeier
Richmond Hill, Ontario, Canada
- Mrs. Jane N. Scarff
New Carlisle, Ohio
- Mrs. Josephine Shanks
Houston, Texas
- Mrs. Billie Trump
Alexandria, Virginia
- Mr. Andre Viette
Fishersville, Virginia
- Ms. Katy Moss Warner
Lake Buena Vista, Florida

ACTING EXECUTIVE DIRECTOR

Mrs. Helen Fulcher Walutes



COMMENTARY

The call for a return to shared values is being heard throughout our country. After 216 years as a nation, we have stopped coming together and begun falling apart. Instead of hard work and sacrifice, it seems that everyone wants a bigger share of a shrinking pie. The melting pot is splintering into multiculturalism, which, while enriching, means that our culture has to be constantly reinvented. Shared values are lost. Restlessness becomes the standard for human behavior.

Our towns have given way to enormous, sterile malls or cute retail villages with all the charm of a Hollywood movie facade. These rootless wastelands have no depth. Is it any wonder that few have parks or public gardens?

The values embodied in the American Horticultural Society represent many of our country's most enduring. One of the great virtues of American culture is that it has spawned many volunteer and member-based organizations. Nonprofit institutions do not supply any of the material goods that, in oversupply and abuse, have been so instrumental in spawning our current values crisis, nor do they exist primarily to provide services. The product of a nonprofit organization, writes management expert Peter Drucker, "is a changed human being." All of them, no matter who their members are or what activities they pursue, have a twofold mission: "to satisfy the need of the American people for self-realization, for living out our ideals, our beliefs, our best opinion of ourselves," and "to give community and common purpose."

Horticulture can elicit many of the virtues one would hope for in a citizen: a sense of place, a sensitivity to change, a pride in craft and the rewards of hard work, patience, and respect for life. It is both an art, encouraging creativity, and a science, eschewing extreme positions in favor of careful observations and thoughtful reflection.

As the harrowing movie *The Handmaid's Tale* suggests, the only salvation for our culture is in our guidance of the future generation. If our children learn strong values—honesty, patience, courage, hard work, education, self-control—we have a chance for cultural growth, not just mere survival. If we nurture our children on such universal values, the roots of the tree of knowledge will grow stronger.

Children learn in a gentle way. Gardens are perfect places for instruction, not just in plants but in life. In gardens children learn about themselves—a most crucial subject. In gardens they have a chance to develop their own values. With such a solid foundation, children will be less susceptible to the influence of fanatics, or a blind acceptance of ignorance. They will learn to shoulder defeat, to plan for the future, to nurture other living things.

We cannot return to the provincial world of Sherwood Anderson's *Winesburg, Ohio*, or to a nineteenth century agrarian life or even any fantasized semblance of these. But perhaps through our horticultural community, we can attain self-realization, and our children can become attuned to the fine balance between choice and obligation, change and tradition, indulgence and discipline.

George C. Ball Jr., AHS President





LETTERS

Wrong Passionflower

Oops! The passionflower illustrated on page 46 of the June issue is not *Passiflora incarnata*, but 'Incense', a hybrid of *P. incarnata* × *P. cincinnata*. While *P. incarnata* has a three-lobed leaf and pale lavender color, 'Incense' has a brilliant purple color and five-lobed leaf. *P. incarnata* and its white cultivar are noxious but lovable weeds in my garden. 'Incense', while lovely, does not persist in Zone 7, and is prone to a die-back virus.

Arthur O. Tucker
Research Professor
Delaware State College
Dover, Delaware

Meserve Holly Hardiness

Can't imagine how I did it, but I seem to have missed reading the February issue of your excellent magazine until today. In the article on hollies by Fred Ebersole, he states that *Ilex* × *meserveae* cultivars seem confined to Zones 6b through 8a.

I am in Zone 5a only a few miles east and in fact north of Zone 4b (our temperatures seem tempered by Lakes Michigan and Winnebago). In 1989 I planted two 'Blue Princess' and one 'Blue Prince' hollies. They have survived three winters and are thriving in a shaded area on the west side of my house. A number of them have been growing at the Paine Arboretum in Oshkosh for many years. I regard them as a wonderful alternative to the excessive planting of yews.

Marilyn Dahl
Oshkosh, Wisconsin

Blue, But Not Frozen

Somehow when your February issue came out I missed the article on hollies.

At my nursery near Butler, Pennsylvania, where we have winter temperatures well under 10 degrees below zero most winters, we have grown and used the *Ilex* × *meserveae* hybrids 'Blue Girl', 'Blue Boy', 'Blue Princess', and 'Blue Prince' almost since their introduction. They have performed well every winter including in temperatures below minus 20.

We also have used 'China Girl' and 'China Boy' for more than ten years. We planted

several of each in a location fully exposed to northwest winds and in full sun, and directly above an exposed stone wall that allows maximum freezing of the root zone. I think these two come out of the winter looking better than the "blue" series.

'Blue Angel' did not hold up to our winters and I do not see it used in our area.

Robert C. Danik Jr.
Valencia, Pennsylvania

More on Osage Orange

In your April "Letters" section, it was interesting to read two responses to Susan Sand's wonderful article on the Osage orange. I thought readers might be interested in hearing about the Osage orange at Haverford College.

It appeared on the original planting plan of William Carvill (c. 1835), at some time fell, and has been recumbent for possibly 100 years. It sprawls all over the area, appears to be very healthy, and sends up new growth continuously. It has become a beautiful living sculpture and a campus landmark. Generations of children have climbed upon this tree and its most common name on campus is, quite naturally, the Climbing Tree. I wonder if your readers have seen another with such an unusual form.

Florence R. Genser
Director
Arboretum Association
Haverford College
Haverford, Pennsylvania

And More

In response to your comments about the dispersal of fruits of honey locust and Osage orange, I must say they do not just lay under the tree.

I have seen squirrels gnaw on Osage oranges and have often found chewed remains of the fruit.

We have a honey locust in our front yard, and when it forms pods—those with the sweet gel inside—the deer eat every one. They do not seem to eat the dry pods of other locusts, but will paw the sweet ones from under the snow.

Carol Minor
St. James, Missouri

American Horticulturist

Editor
Kathleen Fisher

Assistant Editor
Mary Beth Wiesner

Editorial Assistant
Steve Davolt

Design Director
Joseph Yacinski

Designer
Bob McCracken

Membership Director
Darlene Oliver

Editorial Advisory Board

Dr. Gerald S. Barad
Flemington, New Jersey

John Bryan
Sausalito, California

John Creech
Hendersonville, North Carolina

Keith Crotz
Chillicothe, Illinois

Panayoti Kelaidis
Denver, Colorado

Peter Loewer
Asheville, North Carolina

Janet M. Poor
Winnetka, Illinois

Dr. James E. Swasey
Newark, Delaware

Advertising

American Horticultural Society

Advertising Department
2700 Prosperity Avenue

Fairfax, VA 22031
(703) 204-4636

Color Separations
Chroma-Graphics, Inc.

Printer
William Byrd Press, Inc.

Replacement issues of AMERICAN HORTICULTURIST are available at a cost of \$2.50 per copy. The opinions expressed in the articles that appear in AMERICAN HORTICULTURIST are those of the authors and are not necessarily those of the Society. Botanical nomenclature in AMERICAN HORTICULTURIST is based on HORTUS THIRD. Manuscripts, art work, and photographs sent for possible publication will be returned if they are accompanied by a self-addressed, stamped envelope. We cannot guarantee the safe return of unsolicited material.

AMERICAN HORTICULTURIST, ISSN 0096-4417, is the official publication of the American Horticultural Society, 7931 East Boulevard Drive, Alexandria, VA 22308-1300, (703) 768-5700, and is issued six times a year as a magazine and six times a year as a News Edition. The American Horticultural Society is a non-profit organization dedicated to excellence in horticulture. Membership in the Society includes a subscription to AMERICAN HORTICULTURIST. National membership dues are \$45; two years are \$80. Foreign dues are \$50. \$12 of dues are designated for AMERICAN HORTICULTURIST.

Copyright © 1992 by the American Horticultural Society. Second-class postage paid at Alexandria, Virginia, and at additional mailing offices.

Postmaster: Please send Form 3579 to AMERICAN HORTICULTURIST, 7931 East Boulevard Drive, Alexandria, VA 22308-1300.

AHS Affiliates

Members of the following institutions are participants in AHS's Affiliate Membership Program, a networking opportunity available to most botanical gardens, plant societies, and horticultural groups.

American Hibiscus Society
Coco Beach, Florida

Chattisgarh Horticultural Society
Raipur, India

East Tennessee Horticulture
and Landscape Association
Knoxville, Tennessee

Friends of Longue Vue
New Orleans, Louisiana

Friends of Manito Park
Spokane, Washington

Friends of the Botanical Garden
University of California
Berkeley, California

Friends of the Davis Arboretum
Davis, California

Hardy Fern Foundation
Seattle, Washington

Master Gardeners International
Corporation
Alexandria, Virginia

Matthaei Botanical Gardens
Ann Arbor, Michigan

National FFA
Alexandria, Virginia

Newfoundland Horticultural Society
St. John's, Newfoundland

Rare Fruit Council International
Miami, Florida

Santa Barbara City College
Environmental Horticulture Program
Santa Barbara, California

Tennessee Native Plant Society
Knoxville, Tennessee

Texas State Horticultural Society
College Station, Texas



OFFSHOOTS



Plum Jam Time

by Bruce Bair

Just outside Schoenchen, Kansas, is a magnificent plum thicket that late each summer, as surely as it is taking over a patch of go-back, takes over the town. For city slickers, "go-back" is any patch of formerly farmed land returning to its native state. No one knows how long this takes because the country hasn't been farmed that long. I know of patches that have been trying to go back for 100 years but can still be clearly distinguished.

But go-back has its uses. It provides an ideal habitat for the sand hill plum (*Prunus angustifolia*), which along with the American plum (*Prunus americana*) is really the only wild fruit that northwest Kansas produces in quantities plentiful enough to make jam. Yes, I know about ground cherries, currents, prickly pears, chokecherries, and buffalo berries, but who's going to collect enough to make a jar of jam?

The sand hill plum has a huge range over the United States, from the East Coast to the Rocky Mountains. In the South and East it is known as the Chickasaw plum, and in New Mexico it is called the sand

plum. It usually grows in open, sandy, and dry areas and does not like extremely cold climates.

The thicket I'm speaking of is crisscrossed by deer paths, and on muddy days is thick with the tracks of predators that drag their dinner into it, leaving behind little piles of feathers and feet. The plums are the size of a working man's thumb, orange to bright red in color, and hard as rocks. Just before dropping off the tree, they soften and take on a flavor that the imaginative can almost call sweet. In Kansas, nature is stingy with sugar.

The wild plums annually become the main topic of conversation in the town. Late summer is plum pie, plum ice cream, and most of all, plum jam time in Schoenchen.

Life in Schoenchen, which in German means "pretty place," follows a strict set of rules. Basically, the men do what they call "farm" and play softball and the women hold jobs, raise the kids, do the housework, and make plum jam. But even the men are affected by plum jam time. Only now that it is 105 degrees can you find a western Kansas male, all his children in tow, picking fruit.

Five-gallon plastic buckets of plums are plunked on

Continued on page 8

• ROUND-LOBED FLO

• WILD COLUMBINE •

• BEARBERRY •

• WHITE MOUNTAIN AVENS • SESSILE BE

• TRUMPET HONEYSUCKLE • JACOB'S LADDER • PLAINS PRICKLY PEAP • ROSS CAMPION



SEND FLOWERS.

AND KEEP SOME FOR YOURSELF.



Pick them at your Post Office, call 1-800-STAMP 24, Operator 515, or return



the coupon for all 50 wildflower stamps and a beautifully illustrated wildflower book.



But hurry.

Because these flowers won't last forever.



STAMPS WORTH SAVING

Send me the 64-page wildflower book with 50 wildflower stamps. Please send me ____ copies at \$21.95, plus 50¢ postage and handling.

Enclosed is a check or money order (payable to U.S. Postal Service) for \$_____
 Please bill my Visa MasterCard Discover.

Card # _____
Exp. date _____
SIGNATURE _____
NAME _____
ADDRESS _____
CITY _____
STATE _____ ZIP _____

Information which you provide will be protected and only disclosed in accordance with the Privacy Act of 1974.

MAIL TO:
Wildflower Offer
P.O. Box 14326
St. Paul, MN 55114-0328



WILD 8

*Service fee applied. © 1992 USPS

36 USC 380

• HERB ROBERT • MARSH MARIGOLD • SWEET

• WILD COLUMBINE •

• BEARBERRY •

UNIQUE HOUSEPLANTS

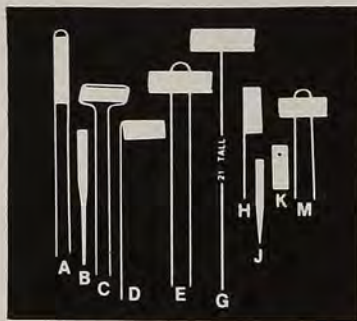


Inhale our Sweet Parma Violets

Established in 1892, Logee's is one of the country's foremost mailorder sources of rare tropicals. Our color illustrated catalog lists over 2,000 of the finest fragrant and flowering plants.

Logee's Greenhouses

141 North Street
Dept. AH
Danielson, Conn. 06239
Catalog \$3.00 refundable



THE PERMANENT METAL GARDEN LABEL

A—Hairpin Style Markers	30 For \$10.00
B—Plant or Shrub Labels	100 For \$ 7.10
C—Cap Style Markers	30 For \$10.40
D—Swinging Style Markers	30 For \$ 8.60
E—Rose Markers	30 For \$ 9.50
F—Tall Display Markers	30 For \$13.05
G—Tall Single Staff Markers	30 For \$10.30
H—Flag Style Markers	30 For \$ 8.30
J—Small Plant Labels	100 For \$ 6.85
K—Tie-On Labels	100 For \$10.90
M—Miniature Markers	30 For \$ 8.10

**Special Quantity Prices Available
Prices Include Prepaid Postage**

INTRODUCTORY OFFER

1 Each: A, B, C, D, E, H, J and K With
Waterproof Crayon, Only \$ 3.00

PAW PAW EVERLAST LABEL COMPANY

P.O. Box 93-AH
Paw Paw, Michigan, 49079-0093

Offshoots Continued from page 6

kitchen counters with almost as much pride as are stinking messes of fish and bloody ducks. "Plum jam time," the intrepid forest forager utters.

This causes females to place their hands on their hips and regard the bucket with something like hate. First of all, the plums must be washed. The fastidious throw away plums in which there is a tiny bore-hole. Some minute insect lays eggs in the flower, and the resulting larva bores its way to the outside, where it presumably metamorphoses and flies away. These tiny holes then provide entry for millions of tiny black ants.

But since the plums have to be boiled ten minutes anyway, nothing harmful is likely to survive. The plums are boiled enough to soften them, then "squeeze" through cheesecloth or a sieve until nothing is left but the pits. The pits are thrown away, and wherever they land, new plum trees spring up. The goopy, steaming mess of plum pulp is combined with sugar in about a six to eight ratio and pectin is added. All this requires boiling at specific intervals, the use of every available kitchen container, and the production of much heat during the most blistering part of summer.

Nothing looks hotter than a Schoenchen housewife in a loose cotton floral print with a wooden spoon in her hand. Probably the women should pitch the plums right out the back door, but they become their own victims. Recipes are exchanged, plum pulping methods are discussed, and jars cool while telephone calls on plum jam are made.

Finally, getting through plum jam time becomes a matter of pride. Who can make the best plum jam? Men go without supper because the kitchen counters are covered with the fixin's for plum jam. Socks go unwashed. The expense mounts. Trips to Hays must be made for more jelling substances, sugar, and jar lids.

The women become plum crazy, plum tuckered out, and plum tired of plum puns, but after a week, things almost return to normal. The kitchen cools; the jars of plum jam are lined up on the basement shelves. Then, with unintentional cruelty, the weekly paper will contain a recipe for plum cake and start the whole process over again.

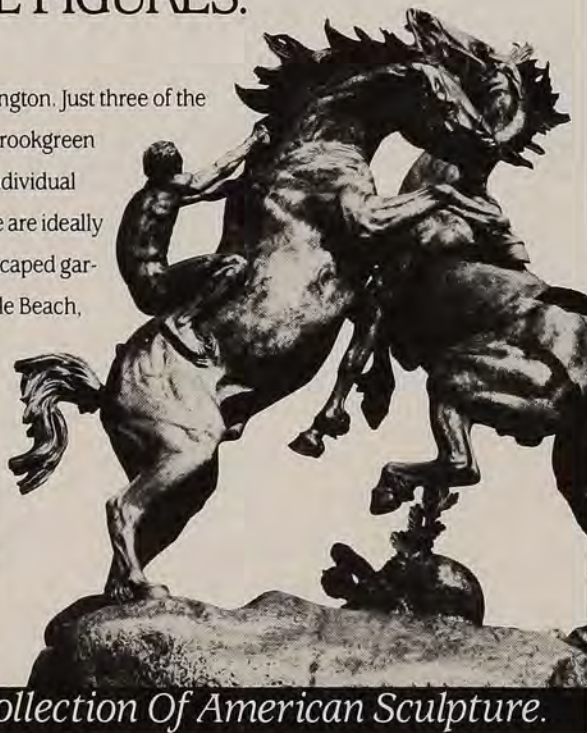
But at last plum jam time passes. Housewives can relax, and when children ask, "What's to eat," their mothers say, "Why, plum jam and toast."

And months later, in December, the men will at last recover from their expeditions into the plum thicket by drinking plum wine.

Bruce Bair is a free-lance writer and professional weather observer in Schoenchen.

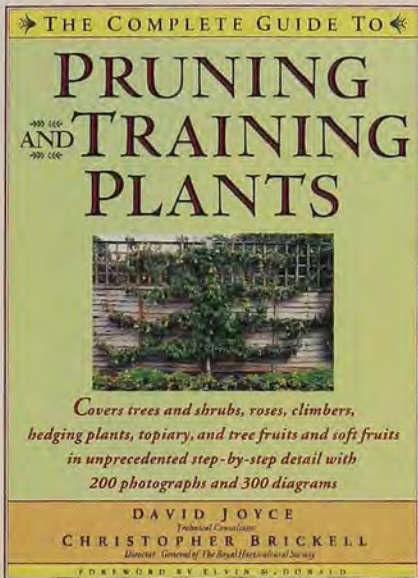
STUDY UNDER AMERICA'S MOST POWERFUL FIGURES.

Remington. Borglum. Huntington. Just three of the artists whose works grace Brookgreen Gardens. Where over 500 individual pieces of figurative sculpture are ideally sited amid extensively landscaped gardens. 18 miles south of Myrtle Beach, South Carolina on Hwy. 17.
Phone 800-849-1931.
Brookgreen Gardens.
It's a learning experience like no other.



The Premier Collection Of American Sculpture.

BOOK REVIEWS



The Complete Guide to Pruning and Training Plants

David Joyce. Simon & Schuster, New York, 1992. 224 pages. 8¼" × 11". Color photographs and illustrations. Publisher's price, hardcover: \$30. AHS member price: \$25.50.

Joyce's new book on pruning is a welcome addition to the serious horticulturist's library. It was written with the technical assistance of Christopher Brickell, the highly respected director general of the Royal Horticultural Society and the author of a 1979 book, *Pruning*. In many ways Joyce's book expands on Brickell's work and it includes the same expert illustrations. It contains a total of 200 photographs and 300 diagrams. This new book reflects updated information on the care of trees—e.g., the scientific research that now precludes the use of "flush cuts" and pruning paints.

Although Joyce discusses the general pruning of trees and shrubs, the book is most useful in explaining the technical aspects of pruning to maximize horticultural effect. For example, the hard pruning needed annually by certain flowering shrubs is excellently described and illustrated. On more herbaceous material,

specialized pruning or "pinching" is used to create cascading chrysanthemums, standard fuchsias, and more.

Renewal pruning and spur pruning for fruiting trees and shrubs are well explained. Joyce often describes more than one method for training and pruning fruit- and nut-bearing trees, fruiting shrubs, and vines. Renovating old trees and shrubs, both ornamental and fruiting, also is covered.

This book is indispensable for the gardener who is confused by pruning requirements for the clematis and the climbing rose or wondering what to do with the wisteria. And this book also will help the more adventurous, those whose heart's desire is to manipulate plants in order to achieve outstanding artistic effect. Several pruning art forms (coppicing, pleaching, pollarding, topiary, and espalier) are covered in depth.

The book contains an index, a glossary, and an A to Z list of shrubs and trees and how to prune them. —Cass Turnbull

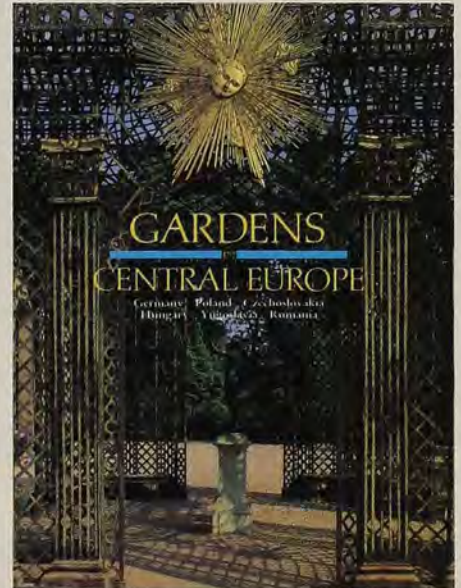
Cass Turnbull is founder of PlantAmnesty, an organization dedicated to ending harmful pruning of trees and shrubs.

Gardens in Central Europe

Patrick Bowe. Photographs by Nicolas Sapieha. M. T. Train/Scala Books, New York, 1991. 215 pages. 9¾" × 12¼". Color photographs. Publisher's price, hardcover: \$55. AHS member price: \$47.50.

While American gardeners have become increasingly familiar with leading gardens of western Europe, the gardens of eastern and central Europe remain shrouded in mystery. *Gardens in Central Europe* is the first major and accessible survey of gardens in Poland, Czechoslovakia, Hungary, Yugoslavia, Rumania, and what was formerly East Germany. Patrick Bowe's lucid text and Nicolas Sapieha's color photographs lift this volume out of the coffee table category and make it worthy of serious study.

Bowe reminds us that central Europe once shared fully in the intellectual and



aesthetic life of western Europe. Kroměříž, in Czechoslovakia, contains a superb example of a late-Renaissance walled garden, such as once existed at the Chateau of Blois and Amboise. Polish King Jan Sobieski's summer palace, Wilanów, is a major baroque garden, replete with formal terraces, allegorical statues, and clipped cones of yew. Among the most striking historic gardens is Frederick the Great's rococo retreat, Sans Souci, constructed at Potsdam in the 1740s. While growing grapes behind glass was widespread throughout Europe, Frederick enclosed a whole vineyard behind glazed doors on south-facing terraces.

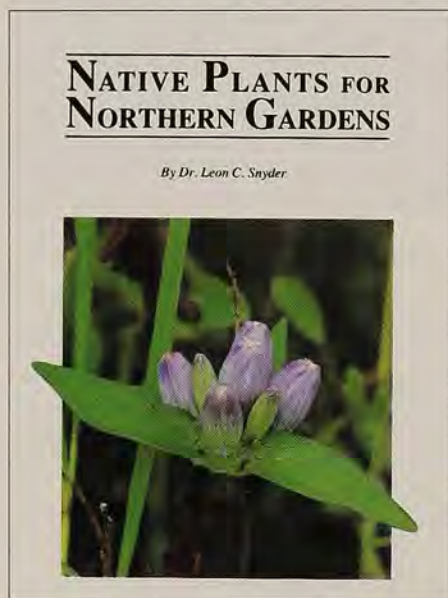
The English landscape movement was strongly felt in central Europe. Worlitz, in Germany, featured artificial lakes, groupings of specimen trees, and such typical landscape-movement structures as a grotto, a hermit's cave, and a "Temple to Flora." Elsewhere, more indigenous interpretations appeared. Influenced by the nineteenth-century Czechoslovakian National Revival, Count and Countess Arnošt Sylva-Taroucca sought to create a garden with a wide range of trees, laurels, and rhododendrons.

Modernism is represented in central Europe by two important exemplars: Mies

van der Rohe's Villa Tugendhat at Brno, where white walls and the extensive use of glass serve to frame views of the garden; and Constantin Brancusi's memorial park at Tirgu Jih in his native Rumania, where sculptures aligned on a central axis combine modern abstractions with Rumanian folk art forms.

This book does have drawbacks, which derive in part from its breadth of coverage. Serious gardeners will want more detail on plantings and more specific identifications than the "pink and white plants" that occasionally accompany photographs. Some will also want, where possible, a plan of the garden and more information on its public accessibility. As an introduction, however, *Gardens in Central Europe* succeeds in informing the reader and whetting the appetite, and should lure both visitors and researchers into the gardens of this important region. —Diane Barthel-Bouchier

Diane Barthel-Bouchier is a writer and gardener in Wading River, New York.



Native Plants for Northern Gardeners

Dr. Leon C. Snyder. *Andersen Horticultural Library, Chanhassen, Minnesota*, 1991. 277 pages. 8 3/4" x 11 1/4". Color photographs. *Publisher's price, hardcover: \$29.95. AHS member price: \$29.95.*

(Note: Our book program was unable to obtain this title at a discount, but because it is not readily available elsewhere, we wanted to offer it to our readers.)

The long-awaited, posthumous publication of garden guru Leon Snyder's sixth book completes the set of volumes devoted to the joys and challenges of gardening in rigorous Northern climates. Although

written for the upper Midwest, the book is appropriate for USDA Zone 3 and 4 gardens across the United States and Canada.

At first glance, this volume has everything Northern native plant fanciers could want in a gardening book: broad coverage of woody and herbaceous plants, a regional focus, cultural information, and an encyclopedic listing of plants. Readers familiar with Snyder's terse writing style will find comfort in consistency. New readers will find informative though somewhat superficial text presented in an objective if uninspired manner.

The greatest strength of the book lies in the comprehensive listing of trees, shrubs, vines, grasses, ferns, and flowering perennials, annuals, and biennials for Zones 3 and 4. The first eighteen pages are devoted to short entries on such topics as nomenclature, hardiness, identification, culture, propagation, and types of gardens appropriate for native plants. The remainder of the book is a series of descriptions covering more than 400 species grouped into the following sections: ornamental trees and shrubs; shade trees; evergreens (trees and shrubs); vines; perennials; biennials and annuals; prairie plants; ferns; and bog and water plants. Each section features lists of plants with outstanding attributes or tolerances, such as fall color, showy flowers, tolerance for wet soil, suitability for ground cover, etc. Each species' entry includes a description with size, shape, bloom time, native habitat, and ranges, as well as a use and culture section with brief notes on ornamental potential, growth requirements, and propagation.

However, I counted nineteen misidentified photographs and the overall quality of the photos is poor. Although homage is duly paid to Snyder by using his pictures, a disservice is done to the reader who must contend with poorly focused, often ambiguous, and sometimes discolored images. Better photos are contributed by others, although they often are mislabeled and likewise off-color. An alarming number of images were placed sideways, presumably to accommodate the page layout. This seems unnecessary, as there is no consistent format to the pages.

Perhaps more disturbing is the ill-advised inclusion of several orchid species in the encyclopedia sections. Although the individual species descriptions state that the plants are "protected and should not be removed from their native habitat(s)," these plants are not available unless they are acquired from the wild. This is alarming in light of the statement within the introduction that "in the discussion of individual species, those that should not be

collected are identified," implying that all other plants can be removed from natural areas with impunity. Not so. Plants should not be collected from the wild unless they are common and permission is obtained from the landowner. No plant, regardless of how common or rare, should be removed from public lands unless as part of an organized plant salvage activity sponsored by a conservation group or native plant society.

Difficult-to-grow species with specific soil and moisture requirements such as trailing arbutus and one-flowered wintergreen are given the same casual treatment as easy-care black-eyed Susans. The same information about some species is repeated in different sections. Cross-referencing would have been sufficient.

While this book will no doubt appeal to regional gardeners and Snyder's devotees, similar information is presented more thoroughly and enjoyably by other authors. What other authors do not have is more than fifty years of experience growing native plants in Zone 4. What other books do not offer is a comprehensive, concise catalog of plants for Northern gardens, many of which are unknown or underused. —C. Colston Burrell

C. Colston Burrell is a landscape designer, writer, and photographer who lives and gardens in Minneapolis, Minnesota.

Book Order Form

- The Complete Guide to Pruning and Training Plants . . . \$25.50
- Gardens in Central Europe . . . \$47.50
- Native Plants for Northern Gardeners \$29.95

Postage and handling: \$2.50, first book; \$1.50 each additional book. Virginia residents add 4 1/2% sales tax. Please allow six weeks for delivery. Prices are subject to change without notice.

Enclosed is my check for \$ _____

Visa MasterCard Exp. Date: _____

Acct. #: _____

Signature: _____

Ship to: _____


Street: _____

City: _____

State: _____

Zip: _____

MAIL TO: AHS Books, 7931 East Boulevard Drive, Alexandria, VA 22308-1300. AH892



**AMERICAN
HORTICULTURAL
SOCIETY
47TH ANNUAL
MEETING
OCTOBER 15-17**

The nation's capital is famous for its beautiful springs, but its autumns are equally breathtaking. The heat and haze of summer are gone. Skies are blue, breezes are balmy. Leaves begin to turn and dahlias, chrysanthemums, asters, and reblooming roses explode in colors that no April has ever seen. Come join your fellow members at our Annual Meeting in our very special seventieth year.

MEETING HIGHLIGHTS

- 🍷 Visit award-winning contemporary gardens in the Washington, D.C. metropolitan area.
- 🍷 Get a behind-the-scenes glimpse of Mount Vernon and other historic gardens.
- 🍷 Hear nationally known speakers including Jane Pepper of the Pennsylvania Horticultural Society, Roger Swain of the PBS series "The Victory Garden," and William Flemer III of Princeton Nurseries.
- 🍷 Visit AHS headquarters at the recently renovated River Farm.
- 🍷 Attend the President's Reception and Awards Banquet at Alexandria's unique Torpedo Factory Art Center.
- 🍷 Participate in the expanded Members' Forum.

FOR MORE INFORMATION

Our Alexandria, Virginia, Annual Meeting will provide encouragement and inspiration for both inexperienced gardeners and seasoned professional horticulturists. Look for a registration form and more information on the Annual Meeting program in the *American Horticulturist* News Edition.

PHOTO BY ANN MCDOWELL

ANNUAL MEETING



B Y R I C H A R D D E V I N E

STROLL THROUGH ANY GARDEN at the right time of day and you're likely to see bees and butterflies flitting from flower to flower or even a hummingbird checking out the local nectar supply. Flowering plants, technically known as angiosperms, have enlisted the help of all sorts of creatures in the process known as pollina-

*Flowers attract pollinators with shape, color, and odor. Bees are partial to flowers in the blue-purple range, such as this New England aster (*Aster novae-angliae*).*

Sex Partners

*Flowers and their
animal pollinators
have some of the
strangest relationships
in nature.*





ANITA SABARESE



BOB AND MELISSA SIMPSON

Top: The inflorescences of the foxglove are male when they first open and then female, an alternation that helps ensure cross-pollination.

Above: The swamp pink uses deception to lure the *Augochlora* bee.

Right: Plants that rely on the wind for pollination usually have simple green flowers and powdery pollen that will scatter easily.

tion—not only bees and butterflies and birds, but beetles and gnats, ants and wasps. Even slugs, pygmy possums, mice, bats, and monkeys get into the act.

Sexual reproduction and pollination have allowed angiosperms to colonize just about every environment on earth, from marshes to mountain tops, deserts to arctic tundra, and even the ocean. There are an estimated 300,000 species of flowering plants in the world today.

Angiosperms began their greatest expansion some 125 million years ago, during the Cretaceous period. They were able to assimilate advances made by ferns, which were less dependent on water than earlier plants, and gymnosperms, which were the first plants to cross-pollinate.

The earliest plants were totally dependent on water for both growth and reproduction. They reproduced by simple cell division, which offered little in the way of the genetic variation that helps ensure a species' survival.

Some 300 million years ago ferns appeared. Their reproductive cycle has two phases: an asexual phase, which can occur in dry conditions, and a sexual phase that requires water but provides for more genetic diversity.

The gymnosperms (conifers, cycads, and ginkgoes) had no need for a water environment at all during their sexual phase because their sperm was encapsulated within a protective pollen grain and dispersed by wind. A conifer's male (staminate) cones are normally borne on lower branches and the female (ovulate) cones on higher branches, which encourages cross-pollination—the transfer of pollen from one plant to another. Pollen from the male cones is dispersed by wind in early spring and eventually finds its way to a female cone on a distant tree.

Conifers aren't exactly the model of speed and efficiency, however, since the process from pollination to seed can take as long as two and a half years. Nevertheless, cross-pollination gave the gymnosperms access to a much larger gene pool, allowing them to produce new and more vigorous varieties. Cross-pollination also diluted potentially lethal characteristics that self-pollination and its consequent inbreeding couldn't overcome.

Wind pollination is not restricted to the gymnosperms, however. Grasses, rushes, sedges, and broadleaf trees such as walnut, oak, poplar, and birch also use the wind to distribute their pollen. The common de-

nominator among these plants is their tendency to form large communities of one or just a few species. Their flowers are usually green or nondescript in color, of simple construction, and have neither scent nor nectar. Although the quantity of pollen they produce is important to ensuring successful reproduction—a hazel bush (*Corylus avellana*) can produce 600 million pollen grains—its nonsticky texture is even more important. The more powdery it is, the farther the wind can fling it. Pollen from *Nothofagus*, a Southern hemisphere beech genus, has been found 3,100 miles away from the nearest community; pollen from alder, birch, and oak has been blown halfway across the Atlantic.

In angiosperms, the sexual phase of reproduction is even further reduced, and further removed from a dependency on water. Unlike the naked seeds of the gymnosperms, theirs are enclosed in a protective ovary. But their phenomenal success has been due to a greater extent to their expansion on the gymnosperms' use of cross-pollination and their enlisting all sorts of creatures in the pollination process.

To help ensure cross-pollination, angiosperms have developed safeguards such as self-incompatibility, spatial separation of male and female organs, and time separation between pollen release and stigma receptivity.

For example, the flowers of foxglove (*Digitalis* spp.) are borne on a spike that blooms from bottom to top, with flowers that are first male and later, female. Bees are drawn first to the females, which have more nectar, and work their way up to the pollen laden males before flying off to the female flowers of the next foxglove. Green dragon (*Arisaema dracontium*) is usually male the first year and female the second. This alternation not only prevents self-pollination but makes it more likely that females are growing during conditions ideal for the energy-consuming process of seed production.

In simplest terms, pollination is the transfer of pollen from the male anther to the female stigma. But such a cut-and-dried explanation fails to reveal pollination's marvelous complexity. For those who've forgotten some botany basics, a refresher:

Flowers typically consist of several parts arranged in concentric whorls. The outermost whorl, the calyx, consists of the sepals. Inside the calyx is the corolla, or petals, usually the most colorful part of the flower. Within these two whorls—collec-



tively known as the perianth—are male and/or female sex organs. The male organs, or stamens, produce pollen in the anthers at their tips, which is transported to the female organs (the pistils, consisting of a basal ovary, a long neck or style, and a stigma). A pollen grain, once deposited on the sticky surface of the stigma, germinates and sends a pollen tube down through the style and into the ovary, where the ovules reside. Sperm nuclei from the pollen grain are delivered to the ovary via the pollen tube and fertilize the egg cell in an ovule. Thus a new individual is born to perpetuate the species.

In order to expand their range without the aid of water or wind, flowering plants had to overcome their lack of mobility by some other means. Angiosperms took advantage of the mobility of animals to transport their pollen far and wide. The animals that acted as transfer agents fed on the products of the flowers and became ever more efficient grazers, while the plants they visited evolved better methods of dispersing and receiving pollen. Thus the two adapted to each other in a magnificent co-evolutionary process.

In some cases this process has been carried to extremes, resulting in highly com-

plex and interdependent life cycles. Gall wasps (*Ceratosolen arabicus*) and fig plants, for example, have developed one of the closest symbiotic relationships known. The inflorescence of the sycamore fig (*Ficus sycomorus*) is a hollow, pear-shaped structure with both male and female flowers growing on the inside wall. At the lower end of the fig is a small opening, the ostiolum, partly plugged with scales. The female fig wasp, powerfully attracted to the fig, forces its way through the ostiolar scales, a feat taking a fair amount of perseverance and determination. Those that break in head straight for the female flowers, of which there are two types: one is long-styled and fertile, and the other is short-styled and sterile. The female wasp can deposit eggs only in the sterile flowers, for her ovipositor is too short for the other. The deposited eggs cause the flower to develop into a gall, and the first of the eggs to hatch are wingless males (the females hatch about a day later). With only mating on their minds, the males search each egg case, and when they find one with a female, they fertilize it. This accomplished, they then gnaw an escape tunnel through the wall of the fig, completing it just about the time the females hatch out. It is also at this

point that the male flowers begin to open and produce pollen. In the female wasps' haste to leave the fig, they tramp over the male flowers and pick up fresh pollen. Once the female enters another fig, searching for the right flower in which to lay her eggs, the pollen she's carried with her is deposited on the fertile flowers.

The almost limitless combination of flower shapes, colors, and odors is the principal means by which angiosperms attract animal pollinators.

Flower color is due to pigments found either dissolved or in solid form in various cell structures. Patterns of color help guide visitors to the pollen. Christian Konrad Sprengel (1750-1816), the father of floral biology, was one of the first to notice the color patterns on flowers and how they were used as homing devices. He called them *saftmale*, or nectar guides. Many bee-pollinated flowers exhibit strongly contrasting color patterns used as nectar guides. Combinations of yellow-blue (forget-me-not), yellow-purple (eyebrights), orange-blue (lupines), and yellow-violet (pansies) predominate in bee-pollinated flowers. Ultraviolet nectar guides, which are invisible to humans, are used at close range by hawkmoths (Sphingidae, also

THE INDISPENSABLE HONEYBEE



DAVID CAVAGNARO

Honeybees are very likely the most important flower pollinators. They are perennial, highly social foragers of nectar and pollen, with communication and navigation systems more complex than any other invertebrate. They evolved in the tropical Old World forests of Southeast Asia and spread northward and westward into Africa and

Europe. Their appearance in North America was largely due to Columbus, who brought them along on his voyages to the New World.

Two of the three tropical species (*Apis dorsata* and *A. florea*) build their nests out in the open, while the third (*A. cernana*) builds its nest in the hollows of trees. Although this offers much needed protection, it also allows dangerously high heat levels to build up. The temperate zone honeybee, *A. mellifera*, which is the most widely distributed species, uses this heat production to keep its nest well above freezing during the northern winters.

Because of their long association with flowering plants, honeybees have evolved highly specific and efficient foraging mechanisms using a hierarchy of flower characteristics to identify and memorize particularly rich food sources. They are capable of formulating plans and mental maps using cues such as flower color, pattern, shape, and odor.

Honeybees adapt quickly to flowers that are colorful, contrast well with their background, and have a central ultraviolet nectar guide. Bee-pollinated flowers are open during the day, offer nectar, pollen, or both, and very often have a minty fragrance. The favored colors are purple and blue, with yellow and orange next (honeybees are colorblind to red but “see” ultraviolet particularly well).

The honeybees’ ability to assimilate information and form a judgement about food quality is nothing short of amazing. They seem to have evolved an innate filing system programmed to take in only specific cues about their food sources, such as what is available, where it is, and at what time of the day it can be found. All other extraneous information is filtered out. And the more they visit the same source, the more the memory of it is reinforced. After visiting a flower patch eight times, a honeybee can find that same patch with a 90 to 95 percent accuracy. Their memory is so good that, in one instance, a bee trained to a particular flower one summer was able to fly directly to that source the following spring (an absence of 183 days!).

When foraging for food, honeybees make use of widely spaced landmarks for triangulation and note the color of a flower just prior to landing (bees remember best the color seen during the last three seconds before touchdown). The color cue is reinforced if food is found and the memory is strengthened by subsequent visits. If no trauma occurs to the bee, the memory becomes permanent.

The information gained from scouting trips is passed on to other members of the hive through an elaborate “dance,” which tells the distance, direction, and quality of the source, while subtle variations correct for such things as the movement of the sun and head winds. It is through this dance that the members of the hive “discuss” the merits of the information found and whether or not to investigate further.

Nectar and pollen, two very important reward substances for bees, are found only in insect-pollinated flowers. Wind-pollinated flowers never tempt honeybees, since they offer very little nutrition. The nectar obtained from foraging trips is transformed into honey by the addition of the enzyme invertase. Worker bees in the hive fan the honey to remove water, and in so doing, dry it to a point where yeast and other microbes are killed. Finally, the addition of oxidases produces hydrogen peroxide, which acts as an antibiotic. This makes it very difficult for bacteria and many molds to metabolize honey and is the reason that honey can be left out without spoiling.

If bees find a particularly good source, such as a field of clover, one colony of these industrious insects can harvest more than 64 pounds of pollen in a single year, and, as a byproduct, produce over 30 pounds of seed. —Richard Devine

called sphinx moths) for precise alignment during their nighttime excursions.

An extreme example of shape specificity is the Madagascan hawkmoth, whose foot-long proboscis is needed to fertilize the foot-long nectary of an orchid, *Angraecum sesquipedale*. Now a related orchid with a sixteen-inch long nectary has been discovered, implying the existence of a moth with an equally long proboscis.

Odor specificity in angiosperms has been developed to an even higher degree than has color specificity, and orchids have refined it to near perfection. It is thought that each of twenty species of the genus *Coryanthes* found in Central America has a specific pollinator based on scent. Even the genera *Stanhopea* and *Gongora*, living side by side in the wild, almost never cross naturally, due to the odor specificity of their pollinators.

One way flowering plants keep pollinators coming back is by offering them a reward. This can be in the form of food (pollen, nectar, or nutritious tissues), substances used in courtship rituals (oily waxes and resins), protection, or nesting sites.

Pollen was probably the earliest reward offered, for pollen-eating beetles and flies were clambering about when flowers first appeared during the Cretaceous period. But plants aren’t in the habit of giving away all their pollen; they’ve devised ways to safeguard it. Some produce much more than they need, while others produce two kinds—one for eating and the other for reproduction. Food anthers containing sterile or less viable pollen are found within the pea family (*Cassia* spp.) and the mulleins (*Verbascum* spp.) Still others, like the sharp-shooting orchids of the tropical American genus *Catasetum*, give their pollinators a little help. *Catasetum* fires a pollinium—a detachable pollen mass—at a bee that has entered its odor chamber. The impact is at times strong enough to knock the bee completely out of the flower.

Nectar and nectaries vary greatly in complexity from plant to plant and even from month to month within the same plant. The sugar content of nectar is regulated to fit the needs of the pollinator. Bird-pollinated flowers have the most dilute concentration at 20 to 30 percent, while the bee-pollinated horse chestnut flower (*Aesculus turbinata*) has a sugar concentration of nearly 70 percent. The bee has to dilute the nectar with its own saliva before it can suck it up.

In spring when the most flowers are in

Like other Aristolochia species, the California pipe-vine (A. californica) fools pollinators into entering the "pipe" where they lose their orientation and remain trapped until pollination is complete.





DAVID CAVAGNARO

A white-lined sphinx moth gathers pollen from a zinnia.

bloom, plants compete for pollinators by producing the highest quality nectar. As the summer progresses and the number of insects increases, nectar quality falls. By August, when there is little competition and the number of insects is enormous, nectar quality is at its lowest.

Almost 2,300 species of plants reward their pollinators with fatty oils. Some oil-collecting bees have co-evolved so closely with plants that one or both participants can't survive without the other. One such relationship exists between bees of the species *Macropis europea* and the garden loosestrife, *Lysimachia vulgaris*. Although the loosestrife can do very well without the bees, the bees are totally reliant on the oil produced by the loosestrife for the nutritional requirements of their grubs.

Several orchid species provide oily, fragrant substances that bees use in their courtship rituals. The so-called bucket orchids of the Central American genus *Coryanthes*, pollinated by euglossine bees, are among the most complex flowers anywhere. Although the bees can obtain the raw materials to make pheromones for courtship from a variety of sources, they expend considerable energy getting them from the bucket orchid.

The sepals of the bucket orchid, which resemble the bent-back wings of a butterfly, are attached to a bucketlike structure beneath. Special glands secrete a clear fluid that fills the bottom of the bucket. Just above the fluid line on one side is a short tunnel leading to the outside. Euglossine bees, while collecting oil from the flower, sometimes slip and fall into the fluid. Unable to climb back out because of the wall's slippery coating, they eventually make

their way out through the tunnel. When the bee reaches the end of the tunnel, however, it is restrained long enough to have two pollen packages glued to its back. Once the glue has set, the bee is "allowed" to fly off. The process is repeated on the next flower visited, but this time the pollen package is removed by a hook projecting from the roof of the tunnel.

Not all flowering plants reward their pollinators. Some lure them into traps by deceiving them with the false promise of food or sex. For example, the Eurasian orchid *Cephalanthera longifolia*, which does not reward its pollinators, impersonates the herb *Cistus salvifolius*, which does. In fact, nearly 8,000 species of orchids contain no nectar whatsoever. One of these is the swamp pink (*Calopogon pulchellus*). The lip, or labellum, of this North American native is covered with a thick net of hairs that resemble pollen-laden anthers. When an *Augochlora* bee lands on the labellum, the lip falls forward, causing the bee to tumble into the column. Here its back is dabbed with glue and pollinia are attached. When the bee visits another flower and repeats its tumbling act, the pollinia are deposited on the stigma.

The greenhood (*Pterostylis* spp.) of New Zealand mimics the appearance and smell of rotting meat to attract flies, gnats, and mosquitoes. By means of a trigger mechanism, it throws its visitors into a chamber formed by its petals. The only way out forces the insects to brush past pollinia and stigma, thus either picking up or depositing pollen. The stench from eight-foot high *Amorphophallus titanum*, native to the jungles of Sumatra, is so strong that some men who have ventured too close have been overcome. This doesn't stop *Diamesus* beetles, however, which find the fragrance of rotting fish and burnt sugar irresistible.

Orchids aren't the only plants that have evolved elaborate traps to detain their visitors while they dust them with pollen and prepare them to pollinate another flower. The flowers of *Aristolochia* species are bent tubes that trap insects, usually small flies, until pollination is completed. When the flowers of the birthwort (*A. clematitis*) first open, the flower is vertical, with the upper end flanged wide to form a flag. *Ceratopogon* gnats are attracted to the flag, but in their attempt to land on it, they slide down the long tube and into a bulbous chamber containing fertile stigmata at the bottom. Unable to climb back

out because of downward facing hairs that block their escape, they are forced to remain in the chamber. During their three-day stay, the gnats are provided with food and a carefully controlled environment. It is during this time that they will pollinate the fertile female flowers if they had previously picked up any pollen. After the anthers mature and shower the tenants with pollen, the flower rotates horizontally and the hairs wilt. Undaunted, the gnats fly out in search of other flowers.

What seems to be one of the cruelest, and at the same time, one of the most remarkable pollination mechanisms, is the mimicking of a potential mate. Once again, the orchids are unsurpassed. Not only have some orchids been able to duplicate to a high degree the shape, color, odor, and texture of an insect's sex partner, but they have been able to present it within the insect's narrowly defined breeding season. During mating time, normally wingless female wasps of the family Thynnidae give off a pheromone that attracts winged males. When a male locates a female, he embraces her firmly with his legs and flies off with her, copulating in the air, some times for hours. The labellum of the orchid *Drakaea fitzgeraldii* resembles the female thynnid wasps in both appearance and scent. When the male attempts to fly off with what he perceives to be a receptive female, the hinged joint of the labellum causes the male to rotate over and contact the pollinia. The male wasp, finally realizing that he's been tricked, lets go and flies off—with the pollinia firmly attached to his back. The orchid performs all this treachery before females have hatched, and the males, having hatched first, are so anxious to mate that they don't detect the floral forgery. If they waited a bit longer until the real thing appeared, the orchid would be unable to compete successfully. Once again, timing is everything.

Plants and animals have not just evolved but co-evolved, adapting superbly to one another. But although extreme adaptation is impressive, it is also rare—the danger being that the disappearance of one can doom the other. The interdependence of flowering plants and their pollinators has taken many millions of years to perfect, but is a model of coexistence we would do well to emulate.

Richard Devine is a former orchid grower who has been a landscape designer in north central Florida for fifteen years.

Where the Wild Things Are

The Center for Plant Conservation tracks down rare species to save them from extinction.



BRUCE CUBBERLEY / COURTESY OF THE HOLDEN ARBORETUM

Brian Parsons, Holden Arboretum's natural areas coordinator, admires the newly opened blossoms of wild lupine.

BY JANE WARE

Brian Parsons grows rare plants. He may have been the first person ever to cultivate some of them. When he succeeds in growing them, it means that, at least for a few more years, they will not be reclassified from rare to extinct.

He's not doing this alone. Parsons and the Holden Arboretum of Mentor, Ohio, where he is natural areas coordinator, are part of the national effort of the Center for Plant Conservation (CPC), a network of twenty-five arboreta and botanical gardens trying to save rare and endangered plants by growing them, preserving their seed, and reintroducing plants back into the wild.

Although naturalists believe that the best approach to preserving species is by preserving the best of their natural habitats, complete and intact, this isn't always possible. Habitats are undermined by human intervention or naturally occurring environmental changes. In these cases, CPC member institutions like Holden raise the chances of the plants' survival by giving them, in essence, foster homes.

But the task is not simple. First, they have to get the seeds.

An extreme example of how difficult that task can be is the 300-mile trip Parsons, his assistant Roger Gettig, and interns Cynthia Jensen and Michael Scott George took to southern Ohio's Shawnee State Forest, the only place in that state where whorled horse balm (*Collinsonia verticillata*) can be found.

None of the four has ever seen the plant growing. They know they are seeking a perennial mint that blooms in late May and now, in July, should still be holding seeds.

A forest ranger has directed them to Lampblack Run Tributary, which they follow uphill into the woods. Almost immediately, George finds a whorled horse balm plant. It's a bit bigger than the common horse balm, with less serrated leaves that whorl out from the stem like spokes, four at a time—and its seeds have already dropped. But George soon finds another, with a single seed still clinging, and the mission begins to look like a piece of cake.

It isn't. For most of an hour the four of them climb, their eyes scanning the undergrowth. They see poison ivy, an orchid, ginseng—but no whorled horse balm. It has just rained and the forest is still drip-

ping. The ground is slippery. It's hot, and the steamy air draws mosquitos. Everyone is relieved when they locate a few more whorled horse balm plants that bear a total of two seeds. Parsons kneels down to check the ground under the plants—a futile search in the wet leaf litter. The whole yield from this climb is only three round, dark and hairy seeds, smaller than peppercorns, now snug in a plastic bag. One is white, which Parsons says may mean that it's immature. And he notes that sometimes, the last few seeds hanging on a plant may be past their prime.

At the end of almost three hours they have only about ten seeds. Parsons drives several

miles back to telephone Allison Cusick, state botanist in Columbus, who discovered this plant here in 1973. Cusick directs them away from the tributaries, to Lampblack Run itself. At last, late in the afternoon, when the last traces of rain are almost dried up and sun filters through the tulip poplars and oaks, the four seed hunters are spread out along the run, stooped over large patches of knee-high whorled horse balm and stashing the rare germplasm into plastic bags. Altogether, they collect 255 seeds, enough not only to sow but to send some to the National Seed Storage Laboratory in Fort Collins, Colorado.

Parsons also cuts two whorled horse balm offshoots—not mature stems, he emphasizes—primarily to verify the species when the seeds grow and flower. It would be easy to take more divisions for growing the plant, but such destructive collecting makes a rare plant rarer.

Because no one has ever grown most of these endangered plants, cultivating them becomes a sort of horticultural pioneering. The seeds don't arrive with instructions, except those that an informed eye can cull from the natural site. Parsons describes the whorled horse balm's habitat along Lampblack Run: "A nice stream bottom. A fairly rich spring flora. Dwarf crested iris. Foamflower. Ferns. Fairly organic, probably subacid soil, about pH 6. A fair amount of shade." The plant is perennial, so he assumes that it comes up year after year from the same roots and uses seeds to expand its turf. But until he succeeds in growing whorled horse balm, its biology is largely unknown. Parsons will share anything he learns with the managers at Shawnee State Forest to help assure that the plant can go on evolving in its natural habitat.

Parsons stands a burly six feet tall, with a heavy moustache and beard and abundant, wavy hair. His khaki trousers tend to ride down on his hips and often carry telltale traces of the environment he's been exploring. If he's been inventorying lilies in Holden's ponds, for instance, his pants are wet to the knees. He says he and Holden's plant conservation program evolved together.

He arrived as an intern in 1977, when he had just finished a Beloit College degree in classical literature, plus almost all of a second major in biology. After his internship, he was hired as assistant grounds superintendent, but he volunteered evenings and weekends to work on the arboretum's woodland wildflower garden. When the



BRIAN PARSONS / COURTESY OF THE HOLDEN ARBORETUM

garden officially became a “collection” in 1980, he was put in charge full-time.

After establishing the woodland garden, Parsons began building a whole array of habitats. Within five acres, he now has established the appropriate growing conditions for short- and tallgrass prairies, bogs, fens, acidic and alkaline rocks and dunes. These habitats are characteristic of the Great Lakes region, and almost all of the 550 plants in them are regional. “We study species associations and cultural requirements,” Parsons says. “It’s like a puzzle. When you try to recreate a habitat, you start plugging in pieces—soil, moisture, sun. If you keep plugging them in, after a while it starts to look like a community.” Many botanic gardens have developed similar habitats, usually for their own native regional flora.

Parsons cultivates regional plants in order to save genetic material unique to a given area. The whorled horse balm is a good example. The species is not nationally endangered because it grows in the southeast from Georgia to Mississippi. But in Ohio, not only is it growing in just one site, but it is also disjunct—it’s 300 miles north of others of its species. Plant scientists usually assume that a disjunct plant will have its own particular version of the species’ genes.

Holden has on display twenty-one plants whose survival is being supported by the CPC, all in the habitats Parsons developed. His first endangered plant, spreading globeflower (*Trollius laxus* subsp. *laxus*), is in the fen, or alkaline bog area. (It is less rare than was thought in 1983, when he began growing it, because more have been found growing naturally.)

The lakeside daisy (*Hymenoxys acaulis* var. *glabra*), whose only natural population in the United States is in an Ohio quarry, grows in crevices on the 100 tons of limestone piled up to make a habitat. The lakeside daisy was originally a shortgrass prairie plant. As prairie was lost to development, the flower moved to the quarry. It is still found in the wild on Canada’s Bruce Peninsula.

The Pitcher’s dune thistle (*Cirsium pitcheri*) is planted in the alkaline sand dune habitat. Found only in the Great Lakes basin, Pitcher’s dune thistle grows on beachfront dunes, an uncommon habitat jeopardized by sand quarrying. Parsons set out thirty of these thistles in 1987. Most grew reliably for several years as modest rosettes of silver green leaves. In 1990 more

BRUCE CUBBERLEY / COURTESY OF THE HOLDEN ARBORETUM



Opposite: At the Holden Arboretum, intern Eric Faber collects data in a habitat designed especially for the rare northern monkshood. Left: The lavender-tinged, late spring panicles of the whorled horse balm are ample reward for intrepid plant conservationists. Below: Spreading globeflower thrives in the fen, Holden’s alkaline bog habitat.

BRIAN PARSONS / COURTESY OF THE HOLDEN ARBORETUM



THE CENTER FOR PLANT CONSERVATION

The Center for Plant Conservation (CPC), founded in 1984, has a small staff (twelve), a big computer (with a 10,000-plant database), and an ambitious purpose: "to conserve U.S. plant species" (which number over 20,000). The CPC's crux is the National Collection of Endangered Species, which now includes 400 taxa preserved from extinction as seeds, rooted cuttings, or growing plants. Never before have so many species been conserved in so short a time.

To develop this collection, the CPC has linked up with twenty-five botanical gardens and arboreta, which represent sixteen biogeographic regions of the United States. Thus, for example, Ohio's Holden Arboretum cultivates and maintains rare plants from the Great Lakes area—Minnesota, Wisconsin, Illinois, Indiana, Michigan, and Ohio. Prior to 1984, many of the CPC gardens already were working with plants native to their regions; about half were already growing some rare plants.

The CPC, which in January 1991 moved from Jamaica Plain, Massachusetts, to the Missouri Botanical Garden in St. Louis, is one of a few outside organizations to have an agreement with the National Plant Germplasm System. As a result, rare plant seeds collected through center efforts are kept in the cold-storage facilities at the U.S. Department of Agriculture's National Seed Storage Laboratory at Fort Collins, Colorado.

When possible, the CPC also likes to guarantee each collected plant's future with the income from a \$10,000 nest egg; so far more than eighty species have been so funded. Currently a third of the \$10,000 comes from the Andrew W. Mellon Foundation; the rest is from individual donors, who want to sponsor a plant from a favorite region or plant group, as was done by the Garden Club of Cleveland, which sponsors Holden's spreading globeflower.

There are many lists of rare plants and animals. The U.S. Fish and Wildlife Service, the Nature Conservancy, and the various states all maintain their own, with varying meanings for terms like "endangered" and "threatened." In 1987 and 1988, CPC began conducting its own national surveys of field botanists to identify species in the most imminent danger and has identified more than 700 species that are facing the most immediate threat to survival.

A close look at these numbers showed that the threat of extinction is unevenly distributed. In 1988, forty-one states had fewer than twenty plants faced with extinction and most of those had five or less. These are relatively manageable numbers; in most states, most critically endangered plants are already in the CPC collection. Three quarters of the species that may be lost in ten years are in Hawaii, California, Texas, Florida, and Puerto Rico. So to save the greatest possible number of species, the CPC decided to focus its resources especially on these five areas.

The second policy shift—to a greater emphasis on genetic diversity—is the result of a 1989 conference on rare plant biology. There's a theoretical correlation between long-term survival of species and their level of genetic diversity. Plants have more genetic variation than mammals, which often enables them to adapt to changing conditions. For conservation, the best way to protect the widest possible range of plant diversity in native habitats, in gardens, and in seed banks is to collect seeds from multiple sites in the wild.

—Jane Ware

For more information contact the Center for Plant Conservation, Missouri Botanical Garden, P.O. Box 299, St. Louis, MO 63166, (314) 577-9450.

than twenty of them flowered flamboyantly, produced thistles, and died. The next year, twenty seedlings appeared in their stead, and six more rosettes flowered.

Not all of the twenty-seven species that Parsons cultivates with CPC support are on display. One, the Murray birch (*Betula murrayana*), conserved as cuttings grafted onto the root stock of yellow birch, is still too small. As far as anyone knows, the one

surviving tree on earth is in Michigan. It's something of a freak, Parsons admits, but he defends growing it. "Everything," he says, "is worth working with. As long as we've taken on this role, who are we to decide whether it's worthy or not?"

There are some plants he can't grow. He doesn't even attempt terrestrial orchids, which to germinate from seed require the presence of mycorrhizal fungi that haven't

been identified. And in the 1988 drought, Holden lost its rare hart's tongue ferns (*Phyllitis scolopendrium*). When Parsons tried again to grow them from spores, germination began and then stopped. He doesn't know why, but he'll try again.

In almost all states, wild plant inventories have pinpointed the locations of rare species, and normally this information is common knowledge among state botanists and even skilled and dedicated amateurs. Rare plants on public lands are often protected by law, and most are safe from collectors because they are of little ornamental value. But some—notably cacti, carnivorous plants, and bulbs—have been raided wholesale. The green pitcher plant (*Sarracenia oreophila*), a showy insect-eater, is so prized by collectors that the sites where it grows are kept secret. That posed a problem for Rob Gardner, curator of rare plants at the North Carolina Botanical Garden in Chapel Hill, another CPC member institution. Before he could begin a program to preserve the green pitcher plant by collecting its seeds, it took him two dozen phone calls to track down someone in Florida who knew where it was growing.

Gardner also grows Peter's Mountain mallow (*Iliamna corei*), a perennial in the hibiscus family that can be as tall as six feet, and is known from only a few wild plants in the Virginia mountains. But it would not grow from seed until researchers discovered that the seeds, which Gardner describes as slightly smaller than a BB, have an impermeable coating. They could be germinated once they were carefully scarified with a razor blade so they could take in water. Gardener says the seeds, though abundant, do not germinate readily even in the wild, which may explain the plant's rarity. One theory is that the seeds may need fire to germinate.

Bill Brumback, conservation director of the New England Wild Flower Society at the Garden in the Woods in Massachusetts, another CPC member, has worked with the rare sand plain gerardia (*Agalinis acuta*), a small annual found at ten places on the East Coast. Never common, the plant thrives in disturbed habitats—a horse trail, a golf course, railroad track—where trampling or even herbicides spell doom for other plants.

When Brumback tried planting gerardia seeds, they would germinate, grow one inch, and quit. But he knew that the plant's relatives were often hemiparasites, so he tried growing the gerardia with little blue-



Top: Interns tally the Berry Botanic Garden's reserve of Malheur wirelettuce seeds. Above: Germinated seedlings of the Malheur wirelettuce await the next attempt at reintroduction.

stem grass (*Andropogon scoparius*), the one other plant common to all its natural sites. It worked; the gerardia's roots attached themselves to those of the bluestem. Now, however, Brumback doesn't grow gerardia at Garden in the Woods, although he still preserves its seeds. "If you try to grow it every year," he explains, "it could become ingrown. It could cross with other species in the garden."

Sometimes when Brian Parsons sows rare plant seeds he confidently emulates nature's methods, for instance, coating milk vetch (*Astragalus* spp.) or lupines with inoculates of the bacteria that they need to thrive. But much of what he does is plodding guesswork, such as methodically offering all new seeds several different sequences of warm and cold periods in hope of hitting upon just the combination they need to germinate. Plants native to the North usually will not germinate until they have been through a long cold period. "They 'learn' not to put roots down in fall because winter kills," Parsons says. "More often than not, all temperate zone seeds need a cold period. But I've been doing this for ten years, so I'm always open to surprises." Some plants require two periods of cold dormancy, for instance.

For five pots of his whorled horse balm, winter—the refrigerator—starts immediately and will last ninety days before the transfer to the warm greenhouse that should seem like spring. Two pots go directly to the greenhouse; after a month one of those will be moved to the refrigerator. One goes to the pit greenhouse, which is partly underground and reflects the ambient temperature.

By trying many options, Parsons hopes to hit on the right one. That worked with spreading globeflower, another Ohio native under CPC protection. A perennial buttercup that produces pale yellow flowers in early April, it proved to have an atypical germination pattern. He collected seeds in late May 1982 at a swamp forest near Youngstown, where he found the plant growing in alkaline soil in light shade to full sun. A local naturalist had been monitoring it for years, so Parsons could time his seed collecting precisely.

Trying a wide range of warm-cold cycles, Parsons found that the seeds grew best with a moist summer followed by an equally moist winter. Although most temperate region plants germinate after just a cold period, the globeflower seed contains an immature embryo that first needs warmth



MARY WALKER

to develop and then needs cold to overcome seed coat dormancy.

Parsons recommended that the state, which funded his study, manage the site by keeping back tree cover (many rare plants are sun-loving species in habitats made shadier by the natural succession of woodlands) and acquiring the watershed. However, the latter was not a practical option.

That experience gave Parsons an edge a few years later with another spring-blooming buttercup, northern monkshood (*Aconitum noveboracense*), which is part of Holden's CPC collection. "A lot of the old literature says it's next to impossible to grow," Parsons says. He found that its seed needed a warm moist period—something researchers at the University of Wisconsin at Milwaukee were discovering about the same time.

Holden is already growing most endangered plants from the Great Lakes region. But in the tropical United States, Texas, and California, cultivating rare flora is a finger in the dike against a projected flood of disappearing species. Should they all be saved? Some people would say so; they believe that thwarting extinction is purpose enough. Faith Campbell, director of plant conservation at the Natural Resources Defense Council (NRDC), says: "I think all species that have made it through the gauntlet of evolution have a right to be here." North Carolina's Rob Gardner adds: "I resist giving arguments like 'It might have medical benefits.'

I resist gauging in terms of how valuable the plants are to us. I think they're valuable on their own terms."

But Les Gottlieb, a geneticist at the University of California-Davis, says saving everything may not be practical. "As far as I'm concerned, all species are not equal. I'd like to see criteria, so as to save the most important, such as crop plants. Or plants with beautiful flowers or of horticultural interest. Or species whose relatives produce pharmacologically interesting compounds. Or species that other species might depend on—the moths and butterflies that pollinate certain plants." Gottlieb is not prepared to start naming dispensable plants but says he'd accept consensus decisions.

Recently, the Pacific yew (*Taxus brevifolia*), a small slow-growing tree found in the Cascades and Rocky Mountains, has demonstrated dramatically how a previously nondescript plant may attain overnight stardom. Taxol, a compound in the Pacific yew's bark, has shown promise in treating cancer. A few years ago, experts at NRDC thought it was endangered because loggers found it a nuisance. Now it's undergoing wholesale harvesting for taxol.

After a rare plant is saved and is flourishing in a simulated habitat in a botanic garden, what's next? Brian Parsons thinks the most important step is "to disseminate the knowledge we develop and get it back to the land managers in a useful form. Beyond a collection of rare plants for display purposes, we don't want to consider

ourselves a plant zoo. We have to identify rare plants and then secure the habitat."

Some plant scientists have gone further, taking garden-grown rare species and restoring them to the wild. A famous example is the Malheur wirelettuce (*Stephanomeria malheurensis*) in Oregon. Linda McMahan, director of the Berry Botanic Garden, CPC's affiliate in Portland, calls this "one of the rarest plants in the continental United States." The wirelettuce, a small plant with stiff stems that withstand wind, grew naturally in one place only, an arid hillside overlooking Lake Malheur, south of Burns, Oregon. Following a fire in 1972, an introduced forage plant called cheat grass invaded the site and threatened the wirelettuce. So in 1987, 500 wirelettuce seedlings were planted at the original site; most survived. When, after a succession of drought years, none came up in 1990, more seedlings were planted, but rodents ate them and none survived. To the jubilation of the Berry staff, *S. malheurensis* came back on its own in 1991. Berry has 50,000 seeds in cold storage as a hedge against future catastrophes.

Les Gottlieb, the geneticist who favors a hierarchy for conservation, was the discoverer of Malheur wirelettuce. He acknowledges the lettuce wouldn't meet most of the criteria he suggests, but he defends it as "of the utmost scientific interest. We can show it's evolved recently as a species. We know about its basic biology."

Another restoration involved northwest New Mexico's Knowlton's cactus (*Pediocactus knowltonii*), which became rare through overcollection. Peggy Olwell, now CPC's manager of conservation programs, was a U.S. Fish and Wildlife Service southwest regional botanist in the mid '80s. She describes Knowlton's as "a very small cactus and so rare that all collectors wanted it. People came from Japan and Germany to collect this cactus." When the natural population dropped to less than 1,000 plants, Olwell decided to try establishing the cactus at a second, similar site nearby. She planted 150 rooted cuttings in 1985 and 75 percent are surviving. However, she notes, while they are flowering and fruiting, no one has seen any seedlings.

Restoration is most widely supported when there's clear evidence that a plant previously grew at a site and can be reintroduced there from local stock. Critics say that when a plant is introduced to a natural area where it has never grown before, the once natural area becomes a garden. "Johnny Appleseeding," Faith Campbell

calls it, “taking the plant out of its evolutionary context and interfering with the ecology at the new site—playing with nature.” She cites the transplanting of purple pitcher plants from Northeast bogs to Southern mountain bogs, “which were functioning fine without purple pitcher plants.”

On the other hand, CPC’s executive director, Don Falk, sees reintroduction as an important strategy for many rare species. “If genes are an ark,” he says, “then eventually the ark must land when plants are reintroduced into a restoration project or protected natural area. Eventually, we want to close the circle and bring these plants back to the land. They can continue to follow their evolutionary paths.”

In March, when bright sun on the lingering snow outside looks like a Christmas card, Brian Parsons walks through Holden’s greenhouse and checks his eight little pots of whorled horse balm seeds. Redolent of forced tropical flowers, the greenhouse is an island of lushness amid the wintery world.

But the whorled horse balm is not doing well at all. Only one of the eight pots has any signs of life—two pale, spindly seedlings. Even for wild plants, for which Parsons says 50 percent germination is excellent, these results are disappointing.

By summer, both seedlings die, though one first develops real leaves and grows in soil. The two cuttings are also thriving, though like many transplanted perennials, they are taking their time.

“I guess I was cocky,” he laments. If he has to go back to Shawnee, he’ll go earlier; the first seed collection must have been too late. Tenacity is basic in this business; tenacity is how he has attained an 80 percent success rate with growing rare plants. Sooner or later, he will grow whorled horse balm.

For the time being, it’s keeping him humble.

Jane Ware is a free-lance writer living in Columbus, Ohio.

VISITING HOLDEN

The Holden Arboretum has 3,100-acres of natural woodlands, fields, ravines, ponds, horticultural collections, and display gardens. It is open Tuesday through Sunday from 10 a.m. to 5 p.m. Admission is \$2.50 for adults; \$1.75 for children ages 6 to 15 and senior citizens. Write 9500 Sperry Road, Mentor, OH 44060, or call (216) 946-4400.



Uncommon plants adapt to uncommon environments. A wily survivor, the sand plain gerardia (far left) loves disturbed habitats, such as golf courses and railroad tracks. Some CPC-protected plants can be found in one place only: the lakeside daisy (left) grows exclusively in an Ohio rock quarry and the Pitcher’s dune thistle (below) grows in the beachfront dunes of the Great Lakes basin.



PHOTOS BY BRIAN PARSONS / COURTESY OF THE HOLDEN ARBORETUM

Barby Walls

*Need a terrier barrier
or a thief thwarter?
Pick a plant with prickles.*

B Y K A T H L E E N Y E O M A N S

There was a day not long ago that I seriously considered surrounding my yard with barbed wire. It wasn't a very neighborly attitude, I know. Still, one has limits. I had just finished repairing the damage done to my perennial border by the neighbors' collie when there he was, rolling around in it for the third time. As I went to the shed to get my garden tools, I noticed the path that the neighborhood children, short-cutting home from school, had worn through my front lawn: time to replant the grass—again. Then, more charitably, I remembered just how many times my own pets had made ruinous dashes through the vegetable garden.

I was fed up, but I couldn't envision standing guard every day, on the alert to shake my hoe and screech at every passing child and wayward mutt. Fences that are halfway attractive are expen-



JERRY PAVIA



MARYL

Left: Prickly pear can provide a spiny deterrent to both two- and four-legged intruders. Above: While a holly won't notify the police if someone tries to break into your home, law-enforcement officials say planting thorny plants under windows may bring a halt to an attempted illegal entry.

sive, and in my neighborhood, not allowed in the front yard.

Then as I was pruning some roses and pulling yet another thorn out of my finger, it occurred to me what effective natural deterrents some plants have against bodily contact by humans and animals. I began to study plants with thorns, spikes, and spines that I might use to erect barriers around those plants less able to defend themselves.

This idea is of course not an original one. The “ha-ha” wall that was prevalent in England until the end of the seventeenth century was a sunken wall or walled ditch that obstructed the travel of deer, livestock, and rabbits not only by being on a different level than the landowners’ vegetable or ornamental gardens, but often by being planted with brambles or small trees to form an impenetrable thicket. In England, the sweetbrier rose (*Rosa eglantheria*) is used to keep cattle in the fields.

In the Southwest United States, it is not uncommon to see contemporary homes and haciendas surrounded by a naturally barbed barrier of prickly pear cactus (*Opuntia* spp.). In Mexico, spiny ocotillo (*Fouquieria splendens*) is used as a living barricade when green, and when dead, as thorny construction material for fences and walls. Even the United States government, which sees defense as a rather serious issue, uses “guard plants.” According to some reports, the trifoliate orange (*Poncirus trifoliata*) is planted around some nuclear and military installations to deter trespassers. A nurseryman in Tennessee sells the plants under the trademark name Living Fence, which he affectionately calls P.T., not for the botanical name but for “pain and terror.”

Although that sounds a little grimmer than anything I want to inflict on an unsuspecting preschooler, the more I looked into it, the more sense the idea of “security plants” began to make. Not only would a living fence be less expensive and easier on the eyes than one of wood or metal, but it could be planted on a hillside or other hard-to-fence area. Perimeter plants are allowed in many jurisdictions that forbid manufactured fences, and where fences are allowed, they can be grown above or beside them as was done with the ha-ha to make the barrier even more off-putting. And hedges, even more so than most fences, protect our gardens and us by providing shade and diverting wind, and when strategically located, can mute and deflect traffic noise.

Of course, when it comes to garden pests



DICK KEEN



ANITA SABARESE



MICHAEL S. THOMPSON

The white blossoms and yellow to orange fruits of the trifoliate orange make it an attractive hedge for the home landscape, but its spiny branches led one Tennessee nurseryman to nickname the plant P.T. for “pain and terror.”

of any type, there are no miracle cures. Gardens on the edge of suburbia have especially persistent problems with marauders hardier and hungrier than poodles. Undomesticated animals, particularly rabbits, have been known to eat a season’s harvest overnight. Racoons, while no threat to greenery, are absolutely mad about corn, berries, and fruit, especially grapes. There are those who say we should just plant some extra endive for our furry friends and learn to live cheek-to-jowl with nature. There are others, however, who have discovered that Thumper and Bambi have no clear understanding of where their crop ends and ours begins.

Rabbits can be especially pesky, because brambles that hinder most small mammals provide homes and hiding places for these lettuce thieves. Remember Br’er Rabbit? Some gardeners have despaired of all other deterrents and begun “marking” their territory, much as an animal does, with human scent—old shoes, sweaty clothes, hair, unlaundered pantyhose, and even urine.

Deer can vault an eight-foot fence, and racoons can climb over, under, or through almost any barrier. A twelve-foot high electrified fence might dissuade these four-footed gourmands, but not all of us like the state penitentiary look. A thick planting of barbs and prickles can deter at least some of the filching, if for no other reason than that many animals will instinctively avoid areas that obstruct a fast getaway.

Deer-country gardeners who have enough space should consider double-hedging. Even if the hedges aren’t especially thorny—and more so if they are, because deer won’t munch most such plants—double rows of four-foot high shrubs planted five feet apart can be quite effective. Deer can easily leap the outside hedge but don’t have enough space to maneuver for clearing the second.

Racoons, who look exactly like the adorable little burglars they are, have sensitive paws and will skirt prickly paths. Lantana, bougainvillea, and dwarf Chinese holly (*Ilex cornuta*) make good racoon-proof ground covers. Deer also avoid spiny hollies as well as thorny acacias.

Unfriendly plants not only give pause to pint-sized human interlopers, but possibly also to larger ones with designs on the family jewels. Barrier plants may serve as the modern-day equivalent of a moat.

Security experts often say that garden walls, fences, and unbarbed foundation plants can actually aid intruders by shield-

ing them from view. However, an American who lived in Venezuela for a short time noticed that many yards were completely bordered with a tall native cactus. Her own home there, surrounded by a six-foot concrete wall, was broken into a number of times, but those of her neighbors, protected by their spiny barriers, were left alone. One of them told her that the cactus fences seemed equally effective against both humans and animals.

It doesn't seem that a holly shrub could hold a candle to a high-tech security system, nor will it alert the fire department if your fried chicken sets the kitchen ablaze. But law-enforcement officials say any measure that limits the movement of a potential offender is worth considering. Will Wood, community relations officer for the Santa Barbara Police Department, says thorny shrubs planted under windows are such an effective deterrent to illegal entry that they are frequently planted for that purpose in commercial landscaping. Thus the natal plum or pyracantha that you admire outside a hotel window may have been put there as much for security as aesthetic reasons. Burglars are creatures of expediency, apparently. Most of them look for an easy entry, and a few thorns may be just what it takes to make them decide that your home might be more trouble than it's worth. Wood suggests that bougainvillea and pampas grass, because it tends to inflict injuries similar to paper cuts, also make outstanding plant barriers.

It may be unnecessary and even unwise to fence your entire yard for security purposes. Law-enforcement officials say it's smart to concentrate on keeping prowlers out of your back yard, where surreptitious doings may not be as readily apparent to watchful neighbors as in your front yard. A four-foot hedge between the back and front of your lot might be ideal, since intruders can't easily step over it, and if they do succeed in getting inside it, it won't conceal them if they're standing upright. And much like the rabbits and deer you hope to keep out of your vegetables, potential burglars don't want to get in a situation where they can't escape; they will avoid an enclosure that gives them no clue as to what lies on the other side. Even open fences, such as chain-link, can be made more attractive, mysterious, and threatening when covered with thorny vines such as bougainvillea and climbing roses.

As plant barriers, roses are among the most friendly to the eye. The modern shrub



DAVID CAVAGNARO

The spiny stems of Fouquieria splendens have earned it the common name of coach-whip. This native shrub can grow to twenty feet tall.

and ground-cover types are relatively maintenance-free. "Meidiland" roses are hardy and thrive in almost any sunny, well-drained location, including slopes. Alba Meidiland ('Meiflorpan') is a sturdy plant with white, continuously blooming flowers, and its dark green foliage turns a colorful yellow in autumn. Red Meidiland ('Meineble') creates a beautiful carpet of deep red throughout the summer, and ends

the season with a winter display of bronzed-colored branches and orange-red hips. Others that have gained popularity in the landscape include Bonica ('Meidonac'), with ever-blooming pink blossoms, and the spreading Pearl Meidiland ('Meiplatin') that has lovely pastel blossoms and deep green foliage.

Opinions are mixed as to whether roses will deter deer, however. Some say that

A GUIDE TO GUARDIAN PLANTS

SHRUBS

rugosa roses and others of that type planted in a dense thicket will keep deer out, although the deer will munch off all the buds. Others say the deer will eat all of the shoots before the plant forms thorns.

Hollies are another visually appealing, tactily hostile alternative to fencing. Their spiny leaves provide natural traffic control, while the bright berries offer all-season beauty. They are vigorous, compact, and there are many hardy ones for Zones 4-9. The blue Meserve hollies include both upright and low-growing cultivars. The slow-growing, less hardy 'Blue Angel' has a deep blue-green leaf that in winter turns a dramatic blue-purple. The taller 'Blue Maid' is considered the hardest of these hollies and can be used as a privacy hedge as well as an attractive barrier. 'Golden Girl' is a blue holly with yellow berries. Also ideal hedge plants are 'China Boy' and 'China Girl', which are easily sheared.

Junipers and other prickly evergreens can form nearly impenetrable thickets. The blue, yellow-green, gray, and gold foliage of modern cultivars can be combined to create dramatic year-round interest. Most evergreens are disease- and insect-resistant. Choose carefully, however, since some junipers can grow into mighty trees—far taller than anything you might need to deter the neighbor's dachshund or Little Leaguer. Low-growing evergreens suitable for ground cover and small hedges include *Juniperus pfitzeriana* 'Gold Lace'; *J. procumbens* 'Nana', 'Sargentii', and 'Sea Green'; and *J. horizontalis* 'Blue Chip' and 'Wiltonii'.

Shrubs of varying heights, ground covers, vines, trees, and even some plants bearing edible fruits make good defense plants. Raspberry brambles can keep nosy dogs and cats out of the flower beds, and a blackberry hedge will discourage any number of varmints. Planted closely, artichokes form a terrific child- and dog-proof perimeter around a vegetable garden. Austrian brier (*Rosa foetida*) or *Asparagus falcatus* can also be used to impede traffic.

A few words of caution are in order.

Do plant your defense garden with a great deal of forethought, because you will need to cross its barriers occasionally for upkeep chores. You will minimize the amount of time you spend fending off your own guard plants if you select varieties that will naturally grow to the height and width you desire with little clipping.

If you are planting around a children's play area, remember that your intent is to subtly deter little darlings from trampling

BOTANICAL NAME	COMMON NAME	ARMOR
<i>Acacia armata</i>	kangaroo thorn	thorny branches
<i>Acacia constricta</i>	white thorn	spines
<i>Agave americana</i>	century plant	spiny leaves
<i>Aloe</i> spp.	aloe	spiny-edged leaves
<i>Berberis</i> spp.	barberry	spiny leaves
<i>Carissa grandiflora</i>	natal plum	spiny branches
<i>Chaenomeles speciosa</i>	flowering quince	thorns
<i>Crataegus</i> spp.	hawthorn	thorny branches
<i>Echinocactus grusonii</i>	golden barrel cactus	thorns
<i>Euphorbia milii</i>	crown-of-thorns	thorny stems
<i>Fouquieria splendens</i>	ocotillo, coach-whip	thorny stems
<i>Ilex</i> spp.	holly	spiny-toothed leaves
<i>Lantana</i> spp.	shrub verbena	prickly leaves
<i>Mahonia</i> spp.	Oregon grape	spiny-toothed leaves
<i>Opuntia</i> spp.	prickly pear	thorns
<i>Poncirus trifoliata</i>	trifoliolate orange	spiny shoots and stems
<i>Pyracantha</i> spp.	fire thorn	thorns
<i>Ribes speciosum</i>	fuchsia-flowered gooseberry	thorny stems
<i>Rosa</i> spp.	rose	thorns
<i>Yucca aloifolia</i>	Spanish bayonet	sharp-pointed leaves

VINES

<i>Bougainvillea</i> spp.	bougainvillea	thorns
<i>Pyracantha</i> spp.	fire thorn	thorns
<i>Rosa rugosa</i>	Turkestan rose	prickly stems
<i>Rubus</i> spp.	raspberry	thorny stems

TREES

<i>Citrus</i> spp.	citrus	thorns and prickly leaves
× <i>Cupressocyparis leylandii</i>	Leyland cypress	prickly needles
<i>Crataegus</i> spp.	hawthorn	thorny branches
<i>Crataegus crus-galli</i>	cockspur thorn	stiff thorns
<i>Maclura pomifera</i>	Osage orange	thorny branches
<i>Pinus</i> spp.	pine	prickly needles
<i>Pseudotsuga menziesii</i>	Douglas fir	prickly needles
<i>Taxus</i> spp.	yew	prickly needles

LOW-GROWING PLANTS AND GROUND COVERS

BOTANICAL NAME	COMMON NAME	ARMOR
<i>Argemone</i> spp.	prickly poppy	prickly leaves and stems
<i>Asparagus densiflorus</i> 'Sprengeri'	Sprenger asparagus	needlelike leaves and prickly stems
<i>Asparagus falcatus</i>	sickle thorn	thorny stems
<i>Echinops exaltatus</i>	globe thistle	prickly leaves
<i>Ilex cornuta</i> 'Rotunda'	Chinese holly	spiny leaves
<i>Juniperus horizontalis</i>	creeping juniper	prickly needles
<i>Lantana montevidensis</i>	weeping lantana	prickly leaves and stems
<i>Pyracantha</i> cultivars	fire thorn	thorns
<i>Rosa foetida</i>	Austrian brier	prickly stems
<i>Rosa rugosa</i>	Turkestan rose	prickly stems
<i>Silybum marianum</i>	St. Mary's thistle	barbed bristles
<i>Taxus baccata</i> 'Repandens'	spreading English yew	prickly needles

EDIBLE PROTECTORS

<i>Cucurbita</i> spp.	squash, pumpkin	prickly leaves
<i>Macadamia integrifolia</i>	Queensland macadamia	spiny leaves
<i>Punica granatum</i>	pomegranate	spiny branches
<i>Rubus</i> spp.	blackberry, raspberry	prickly branches



Don't be fooled by the benign-looking red blossoms of the fuchsia-flowered gooseberry—they camouflage the plant's bristly spines.

your prize dahlias, not to cause permanent bodily harm to your own or anyone else's progeny. Avoid plants with sharp-pointed spines and thorns, and use plants like lantana or juniper that have prickly but not harmful foliage.

A manageable bed width is vital. A bed that is five feet wide can be reached easily from either side, so that no one will have to thrash through a thorny thicket for seasonal cleanup. Consider using weed-controlling fabrics when preparing the planting bed, or pre-emergent weed control chemicals in areas where they are considered safe. Mulching around plants is an environmentally friendly way to reduce weeding chores. And when pruning, don't be macho. Wear leather gloves, long-sleeved shirts, and long pants. Nothing delivers as nasty a bite as a bougainvillea, except perhaps a yucca. Goggles to protect your eyes are also a prudent idea.

In addition to the threat to your own skin, there are a few other disadvantages to using plants to protect either your carrots or your karats. If the spinach will be up next week or a cat burglar has hit everyone on the block but you and you'd like some extra protection before you bed down this evening, a living fence won't quite do the trick since it will take months or years to establish. Nor will plants stop a determined professional burglar, although they will discourage vandals and other less intent trespassers.

Wood, stone, or metal fences won't need trimming, watering, or pruning, nor are they subject to drought, root rot, insects, or fungal and viral scourges. But the relatively low cost and the variety of plants that will grow in less than ideal situations far outweigh the disadvantages.

Thanks to my newly established rose fence, romping children and roaming pets have stopped frequenting my flower bed this season. My neighbor the collie owner, who'd been having trouble with squirrels in her outdoor containers, borrowed a few clippings from my living fence to keep those fluffy-tailed rodents out of her nasturtiums. But she reports they've had no effect on keeping her pesky dog out of her hosta bed.

Kathleen Yeomans is not normally in the business of inflicting injuries. The Santa Barbara, California, freelancer is a registered nurse with a book on garden tips for people with disabilities, The Able Gardener, to be published by Storey Communications, Inc., this winter.

Let's Hear It for Annuals!

If you think they're too "common," think again.



PHOTOS BY JOANNE PAVIA

Above: Old-fashioned sweet peas are a tempting choice for the annual garden although they don't grow well everywhere. Here they grow on a fishing net with nasturtiums. Right: The blooms of red flax seem to float on the air.

B Y E L I S A B E T H S H E L D O N

No one could be more pleased than I that perennials are attracting more enthusiasts every year. It's satisfying to grow plants that reappear every spring like old friends. It's fun to work out color combinations and blooming periods to have blossoms spring, summer, and fall. And it's reassuring to find that there are perennials for almost any site, whether dry or wet, shady or sunny. But even a perennials devotee can sometimes use a few annuals here and there, to fill in gaps in permanent plantings, to lend some color in late July or August when it's hard to keep the perennial garden looking cheerful, or to fill containers with plants that will flower all summer.

Most perennials, despite the claims of plant catalogs, bloom for only several weeks (there are some notable exceptions), while many annuals, once they start to bloom, go on nonstop until the frost kills them. Annuals might be the answer, too, for flower lovers too transient to put in perennials.

Perennial gardeners may feel it is cheating to plug holes in their borders with annuals, but they may rid themselves of their guilt. The best gardeners have done it, including all the saints in the gardening calendar, such as Jekyll and Sackville-West.

Given the many interesting annuals that can be grown from seed, it is astonishing that, in my part of the country at least, one rarely sees anything growing in people's gardens except petunias, red salvias, and

marigolds. I have nothing against petunias. I try not to hold red salvia's violent redness against it. And the only things with which one could reproach marigolds is their rubbery texture and objectionable odor. But why don't we plant anything else? True, some people put alyssum or blue lobelias next to their marigolds and red salvia. Some people even have zinnias and for the shade, impatiens. It is possible to encounter calendulas, nicotiana, snapdragons, and nasturtiums. Even so, that is a very limited repertoire.

One supposes that the residents of these homes feel limited to the few varieties of annuals offered in flats at their local garden centers. Commercial growers have got onto five or six annuals that are easy to propagate and sell well. The breeders concentrate on them, inventing new colors, doubling and tripling them, ruffling and fringing them, making giants and dwarfs out of them, and no one seems to object. Gardeners who like to plant annuals should start clamoring for more variety. Or they might get hold of some seed catalogs and start raising their own. A whole world of annual treasures is at hand.

For example, have you ever tried red flax (*Linum grandiflorum* var. *rubrum*)? Blue flax is one of the delights of the perennial garden, not that it's terribly perennial. But red flax doesn't even pretend to be perennial. Its brilliant blood red flowers have the same satin sheen as the blue ones and, since flax plants are feathery, without much



A TALL COOL ANNUAL FOR AUGUST



DAVID CAVIGNARO

August means agony for most American gardeners. Overpowering heat, inevitable droughts, and local water restrictions play havoc with the sweet, orderly calm that gardens offer their creators during the other eleven months of the year. August is when wilt, mildew, and black spot take a nasty turn through the foliage, and listless plants hang limply above the sunbaked earth.

It's a time when the gardener's best intentions seem to count for naught. August is the one month out of the whole year that the usually cheerful, indefatigable gardener comes close to ripping out flower beds and pouring concrete. Many who could not bear to leave their gardens for even a weekend in May or June simply toss in the trowel and pack their bags for two weeks on the beach, in the mountains, or "anywhere away from here."

This annual exodus from the garden actually does have its positive side. First of all, it gives one the satisfaction of seeing that everyone else's garden looks fairly awful, too. Misery does love company. Second, keeping away from weeding and digging for fourteen days allows even the most ground-in dirt under your fingernails to slowly but surely disappear. This means you can eat in a restaurant without hiding your hands under the tablecloth each time a snooty waiter comes around.

But the best part of escaping during the garden's annual droopy days is that, if you have taken the proper steps, you can return refreshed and renewed in time to enjoy the long, spectacular display of cleomes that takes the well-planned American garden from the dog days right into an altogether better time of the year. A big, fluffy display of five-foot-tall cleomes makes the garden, and the gardener, feel fresh and alive again.

Cleomes are one of the best things going for August, yet no one seems to have written much about their use. It is a puzzle why annuals—those eager-to-please, quick-to-the-rescue flowers—don't receive the cheers and love the biennials and perennials inspire. They grow quickly, flower like crazy and, since their life cycle is limited to one summer, have no off-season requirements except a respectful cremation on the autumn bonfire.

Cleome is pronounced "kle-O-me" with long vowels, by

everyone except a few Southerners who say "kle-om" to rhyme with home. Either way, it is a charming name for a sweet, old-fashioned flower that will make airy balls of pink, white, or rose purple flowers during the garden's awkward stage.

A few old garden books briefly dismiss the cleome with one line, typically describing it as a "tender annual from South America, sow in the greenhouse in early spring," but this is one time when the old books aren't entirely right.

A lovely variety is *C. hasslerana*, originally from South America and offered for sale as *C. rosea* in the Flanagan and Nutting catalog published in London in 1835. The old books are right that it is a tender annual, but there is absolutely no need for greenhouse sowing. In fact, *Hortus Third* recommends that the seeds be sown where the plants are to stand, and the best time to do this is after the last frost. It is much easier to scatter seeds than to sow indoors and transplant, and done in this way the flowering period hits just when the garden needs it most.

Cleomes germinate freely, and the sprouts are easy to recognize. They look exactly like the little marijuana-leaf earrings and brooches that otherwise perfectly nice teenagers wear to torment their parents. But almost before you can chant "Just say no" 100 times, these little sprouts reach an impressive height of three to five feet and begin producing airy flower clusters, six to eight inches across. The first flowers appear at the top of the plant, with later ones sprouting from side branches.

As the long blooming period progresses, spent blossoms transmogrify into funny little seed pods that stick straight out from the plant like tiny flying green beans. Some say that these pods are the origin of the plant's nickname "spider flower" because they look like arachnid appendages. For all with a low spider gross-out quotient, I'm happy to say that flying green beans are more like it, and cleome sounds prettier than spider flower any day.

Like most of us during the most oppressive days of the eighth month, cleomes tend to droop slightly at midday. However, once the sun begins to fade, they will quickly recover to shimmer under a summer moon. They also look wonderful early in the morning. Celia Thaxter (1835-1894), author of *An Island Garden*, especially liked the way "cleome rises all over . . . in rosy purple clouds."

It is good to remember that the simplest old annual can restore the wish to wander in the garden and thus refresh the soul of the summer-weary gardener. —Katherine Whiteside

Katherine Whiteside is the author of *Antique Flowers and Classic Bulbs*.

bulk, the flowers seem to float on the air. They are lovely with the sunlight shining through them.

Other wonderful reds are found in annual poppies. Shirley poppy (*Papaver rhoeas*) mixes contain all shades of pink, white, rose, and a fine crimson. *P. somniferum* has wide glaucous leaves and comes in solid pinks, reds, and white, single or double, and some are marked with a

cross. The tall *P. somniferum* 'Danebrog' produces large fringed single blossoms either of peach or bright red, stamped with a white cross in the center. Annual poppies will seed themselves around your garden. If you want them to grow in a particular spot, gather the dry pods and sprinkle the seeds there in the fall.

Annual *Dianthus* include some gorgeous true reds, such as *D. chinensis* 'Fire Car-

pet', along with pinks, lilacs, salmons, and whites. These flowers, which grow in low compact mounds, can be found single and double, bicolored (*D. chinensis* 'Snowfire') and fringed (*D. chinensis* 'T & M Splendour Mixed'), and many are fragrant.

Salvias needn't be red. The closely packed purple spires of the ordinary *Salvia farinacea* are very effective in the summer garden. (It is often misleadingly described

as blue and it does dry into a Wedgwood blue; people who see it in winter bouquets think it is dried lavender.) There is a white one offered now as well, but I think it's dingy. A better choice would be *S. viridis*, whose tall stems bear interesting bracts of several subtle colors—rose, a greenish white, and lavender. Since salvia means sage and these plants are close relatives of our seasoning herb, *S. atropurpurea*, they are pungent as well as pretty.

Because most annual *Scabiosa* grow to three or four feet tall, they are not easy to use as fillers in a perennial border. But they are wonderful for a garden of annuals or for a cutting garden, if you are so lucky as to have space for one. *Scabiosa* need to be staked, but you'll be glad to have gone to the trouble when you see the pouffy round blossoms in shades of lavender, pink, white,

and an indescribable, deep wine red. There is a new form, 'Double Dwarf Mixed', said to confine itself to eighteen inches.

Something else that grows too tall and broad to use in most perennial gardens is the ordinary cosmos (*Cosmos bipinnatus*). It does produce an endless supply of cut flowers, however. The smaller *C. sulphureus* 'Klondike' would go well in any garden of hot colors, as it usually grows no higher than two feet and has flowers of vivid shades of yellow and flame. It doesn't make a good cut flower and is to be enjoyed as it stands.

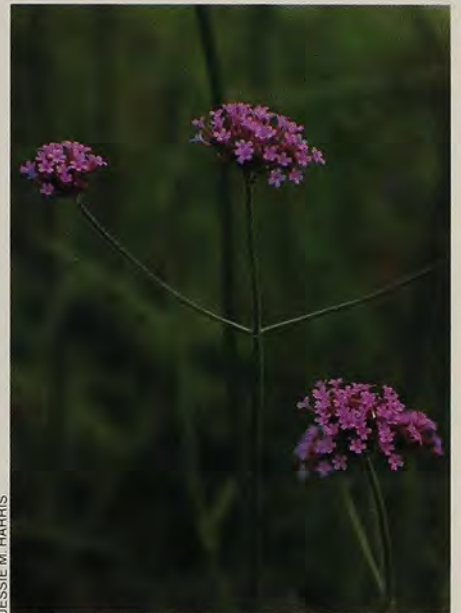
Spider flower (*Cleome hasslerana*) is another tall one at three to five feet, imposing in spite of the lacy quality of its blooms. Compact and straight, it could be used in the border, and its shades of pink, rose, lilac, and white harmonize well with most

perennials. (Editor's note: Katherine Whiteside, another cleome admirer, pays homage to this flower on page 34.)

Some people grow everlastings as garden plants but I prefer to keep them separate. They do come in wonderful colors but many of them tend to be tall and awkward, and one wants to cut and hang statice (*Limonium* spp.) as soon as it begins to open. *Helipterums* have good blue gray, succulent foliage and pink, salmon, or white flowers but don't bloom forever, even when regularly cut. I might be willing to allow the bright red *Gomphrena globosa* 'Strawberry Fields' into a garden of hot colors, but I consider *Celosias*, both *C. cristata* and *C. plumosa*, utterly revolting either fresh or dried, with their horrid colors and textures. There will be those who disagree, but surely all of us gardeners



MICHAELS THOMPSON



JESSIE M. HARRIS

Above: Verbena bonariensis will reseed and create a forest of small lilac-colored flowers. Right: The electric blue flowers of Salvia patens are no doubt responsible for its common name of gentian sage. It is grown as an annual in the North.

should be allowed our little prejudices?

For the Northeast I would not advise trying to grow sweet peas (*Lathyrus odoratus*), although they are hard to resist. No doubt I am underrating the skill of others; the fact that I have tried and failed doesn't prove the thing is impossible. My father, who adored their fragrance, used to grow them in the Midwest. As I recall he planted his seeds in a trench and gradually filled it in during the summer as the bottoms of the stems began to yellow from the hot dry weather. Sweet peas really perform best while it's still a bit cool and moist and they don't seem to like the heavy clay in my garden, where their seeds rot during the long spring rains.

Verbena will thrive here, however. There are dazzling collections offered in white and almost every shade of the pink-red-violet range. *V. hybrida* grows as high as twelve inches, has attractive, long, opposite, blunt-toothed leaves, and each blossom stem bears a cluster of small flowers that looks like a tiny individual bouquet. You can root cuttings of your favorites and keep them indoors for setting out in spring. The last couple of years I've been growing *V. bonariensis*, a great find, as it seeds itself generously—not to say frantically—so that even after scratching up most of the babies in the spring you're bound to have a jungle of them all during late summer and fall. Imagine three feet or more of tall slim stems with widely spaced, opposite, pointed leaves, topped by clusters of small blue-purple flowers. Singly, these plants wouldn't mean much, but a forest of them is most satisfactory.

One year I grew *Heliotropium* 'Hybrid Marine' and was tremendously impressed by its thick, ribbed, deep green leaves and immense purple heads. They looked like Victorian greenhouse plants, but in spite of the catalog description, had no discernible fragrance. I've heard that the species, *H. arborescens*, actually is scented although less flashy.

In my old-fashioned garden period I tried mignonette (*Reseda odorata*), another plant renowned for its aroma. I knew it wouldn't be splendid looking but it was even less showy than expected. The plants were greenish pink nondescript individuals and, worst of all, I couldn't detect the famous perfume. The bees did, being more sensitive than I, and had a mignonette festival that summer. I may try again with the one called *Reseda* 'Fragrant Beauty'. Its allegedly "haunting-sweet fragrance" sounds as if it

would take care of my complaints.

Annual or China asters (*Callistephus chinensis*) look splendid in seed catalogs. With regret I admit being unable to grow them. My lusty plants keeled over one after the other just as they were beginning to flower. A fungus often found on the seeds and roots causes them to wilt. They are also troubled by many insects, which must be sprayed or otherwise dealt with. Even if they retain their health they bloom for only five to seven weeks, so one must plant early, midsummer, and late cultivars in order to have flowers all summer long. The newer China asters are said to be wilt-resistant, but you're nevertheless cautioned not to plant them twice in the same place.

One of the annuals I do use a lot is *Lavatera*, one of the mallows. Some are two to three inches high, some go to four

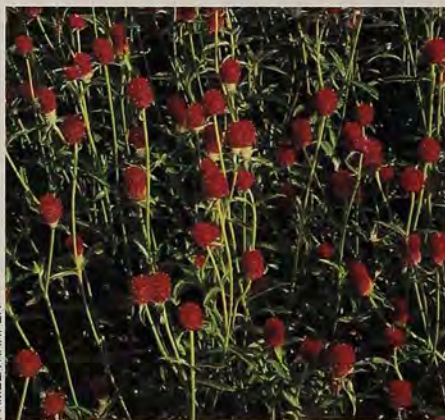
feet (*L. trimestris* 'Loveliness'), and all have trumpet flowers in white or shades of pink. *L. trimestris* 'Mont Blanc' and 'Mont Rose' are twenty-one-inch, compact plants that help out tremendously in July and August and go on blooming until frost.

One good reason for growing annuals is that they provide us with most of the true blues available for a summer garden. Many perennials described as being blue are actually lavender, mauve, lilac, violet, or just plain purple. There's nothing wrong with that—but they're not blue. And many of the really hardy true blue perennials have finished blooming by late spring.

The blue pimpernel (*Anagallis monelli* subsp. *linifolia*) is about the same size as the little annual blue lobelia and has flat one-inch, five-petaled flowers. It looks its best making dazzling low ultramarine

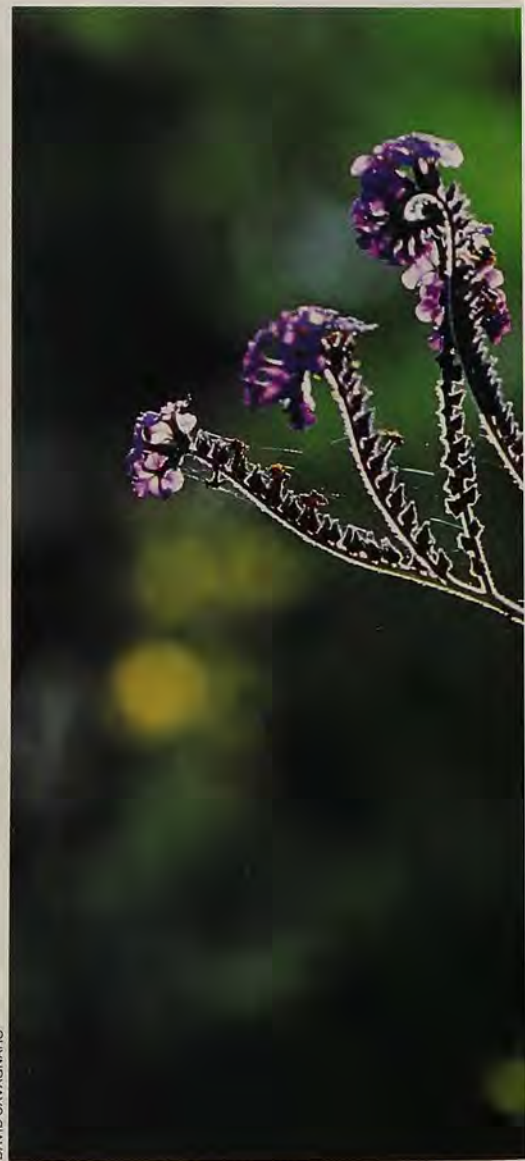


C. COLSTON BURRELL



PAMELA HARPER

Top: The dazzling Mexican tulip poppy grows no more than two feet tall. **Above:** *Gomphrena globosa* 'Strawberry Fields' is a welcome addition to a hot-colored garden. **Right:** *Heliotropium arborescens* has been used in making perfume, but it's not as showy as some of its cultivars.



DAVID CAVAGNARO

mounds against the gray rocks of the Kabylie Mountains of Algeria, but is very pretty indeed in our lowland gardens.

Centaurea cyanus, the well-loved cornflower, comes dwarf, medium, or tall, in several colors including blue. One catalog offers a double one, 'Blue Diadem', which it describes as "intense deep blue." Very tempting.

Next summer I mean to grow *Phacelia campanularia*, the California bluebell. I've been reading long enough about its "up-turned, bell-shaped, gentian blue flowers." That's a short one—only nine inches.

Another small charmer is baby-blue-eyes (*Nemophila menziesii*), which has, just as the catalog says, "glorious sky blue" blooms. You will hate to see it go when the frost comes. *N. menziesii* prefers part shade.

The Texas bluebonnet (*Lupinus texen-*

sis) is famous for its color. I grew a group of them that kept me happy all one summer. They grow to only twelve inches so they are easy to place.

Love-in-a-mist (*Nigella damascena*) comes in what is called the 'Persian Jewels' mixture—mauve, lavender, rose, white, and blue. There is also one called *N. damascena* 'Miss Jekyll' that is bright blue, semidouble, and charmingly reticent. The "mist" is the feathery, ferny leaves that surround the flower. Interesting, round, striped seed pods are a bonus, and it self sows, which is another.

An almost startling turquoise blue is found in *Oxypetalum caeruleum*. I grow it in the garden and pot up the plants to winter over in the parlor window. They make clusters of half-inch stars, which are real jewels and well worth a little trouble.

Larkspur (*Consolida ambigua*), as we all know, comes in a light blue as well as in white and shades of pink and violet. Here I was unable to keep it from mildewing, but a fungicide could prevent that.

Cynoglossum amabile 'Firmament', called Chinese forget-me-not by some people (as is the perennial *Brunnera macrophylla*), has gray green foliage and clouds of delicious small sky blue flowers. This is a great joy when well grown. As each plant finishes blooming, I pull it up, saving the seed-covered branches. In the autumn I shake these along the front of the border so that I'll have blooming plants all during the following summer.

The last and perhaps the most divine blue of all is that of *Salvia patens*. It will grow to a floppy twenty-four inches and carries startling, almost electric blue



A MALIGNED PERENNIAL FOR SEPTEMBER



DAVID CAVAGNARO

Pity the poor goldenrod. Since the middle of the sixteenth century this tall, sunny-natured country bumpkin has been alternately welcomed by and spurned from refined garden society with heart-wrenching regularity. However, despite the vicissitudes of border fashion, goldenrod has retained its innocent appeal. With the current trend in meadow gardens on the rise, this thoroughly reliable plant is finding itself, once again, invited into all the best gardens.

British botanist William Turner (1508-68) was one of the first to write about goldenrod. Turner, who also experienced alternating periods of popularity and exile according to the whims of Henry VIII, extolled the plant as one of the very best healing herbs.

In Turner's final edition of a *A New Herball*, published the year of his death, he reported its almost magical restorative effect on both external and internal wounds. He also recorded the exorbitant prices commanded for dried specimens of this highly valued plant, noting that it had to be imported to England at enormous cost.

Right after this authoritative herbal was published, goldenrod was discovered growing wild in Hampstead, at the edge of London, and immediately the cachet of the plant plummeted. Even its healing properties came under dispute. Too much of a good thing was simply not profitable.

John Gerard (1545-1612), never one to hold back his opinions, let the botanical world know exactly what he thought of the inelegant manner in which goldenrod had been ousted: "I have known the dry herb which came from beyond the sea sold in . . . London for half a crown an ounce. But since it was found in Hampstead wood . . . no man will give half a crown for a hundredweight of it . . . This verifies our English proverb 'Far fetched and dear bought is best for ladies.'"

So there it began. The debate over goldenrod's suitability for the garden still is divided between the "darned upstart weed" and the "beautiful wildflower" teams. It needs to be said that goldenrod is simply one of those pretty, robust flowers that gardeners of accepting character consider a welcome member in informal situations.

There are over 130 species of goldenrod (*Solidago*), and although some are found in Europe, Asia, and South America, most are native to North America. The first American species to go to England, *S. canadensis*, was collected by John Tradescant the Younger in 1648 and grown in his fashionable London garden. Undoubtedly the plant enjoyed at least five minutes of fame from this exposure.

The Latin name *solidago* is from *solidare*, to unite, and recalls the plant's once stellar reputation for healing properties. All this reference to the healthy aspects of goldenrod might seem odd to those who still mistakenly hold to the ugly rumor that the fluffy yellow flowers of this plant are responsible for the agonies of hay fever. This refutable gossip persists, despite complete exoneration from the medical world. The rumor holds no more truth than the ancient belief that goldenrod held in the hand will lead one to hidden treasure.

There are no tricks to growing this guileless perennial. Simply plant seeds or plants where they can feel comfortable at their full height—up to six feet—and do not expect absolutely perfect manners from them. They will sprawl gracefully at the back of a border or send up golden sprays among the tall grasses of a wild garden. They will spread copiously, so it is impossible to have "just one or two": They look best as they grow naturally, in great golden waves.

There is nothing better than enjoying a September sunset surrounded by the hum of bees fumbling in the goldenrod. One of the twentieth century's great plant connoisseurs, Graham Stuart Thomas, magnanimously included the goldenrods in his selective work *Perennial Garden Plants* and wrote that these plants "give gaiety to the sere touch of the waning year."

—Katherine Whiteside

dragon's-head flowers. The plants can be lifted after the first frost, and the roots kept in buckets or boxes of slightly damp sand and peat until spring. I put them in the cool basement and add some water two or three times during the winter. They should not be made soggy. You can plant them out as soon as there is no further danger of frost. An alternative to preserving the roots is to gather the seeds every fall and start them indoors in early spring.

Leaving the blues for the opposite side of the color wheel, there is a yellow that can't be recommended highly enough—*Hunnemannia fumarifolia*, the Mexican tulip poppy. Try it if you would like to dazzle yourself with the sight of glistening two- to three-inch golden cups dancing above ferny glaucous foliage. They will grow at the most to two feet, so you can tuck them in anywhere. There is one called 'Sunlight' that may be even better than the species I have grown, although it is hard to believe it possible. All poppies, of course, should be sown either where they are to grow or in peat pots so that they can be set out without disturbing the roots.

As I have noted, some of these annuals will seed themselves, so if you keep them weeded the first year and watch out for seedlings the following spring you won't have to buy seeds but once. Simply lift the seedlings and plant them where you want them—or leave them where they are, if there's room. Self-sown seedlings are always much sturdier than seedlings raised under glass or in the house.

In discussing—for the most part—only the annuals I have grown, I have but scratched the surface of what is available; there are countless fascinating plants to experiment with and a prowl through the seed catalogs will arouse your spirit of adventure.

I never cease to marvel at what one can bring forth by cooperating with one-sixteenth of a teaspoon of tiny grains found in the bottom of a seed packet.

Elisabeth Sheldon is the author of A Proper Garden.

SOURCES

Geo. W. Park Seed Company, Inc., Cokesbury Road, Greenwood, SC 29647, (803) 223-7333. Catalog free.

Thompson & Morgan, P.O. Box 1308, Jackson, NJ 08527, (201) 363-2225. Catalog free.

Taming the Texas Madrone

Thought to be dwindling in the wild, it's now being propagated for gardeners.

BY MARILYN HADDRILL

As a relic of the Ice Age, the Texas madrone tree (*Arbutus xalapensis*) learned harsh survival lessons as it evolved through the millennia. This durable evergreen member of the heath family (Ericaceae) manages to thrive on the sparse moisture of its arid native habitat. Yet it retains a striking beauty common to the flora of more lush, tropical regions, with its clumps of white to pink urn-shaped flowers, red to orange berry clusters, and deep green leaves. Its twisting, bare trunks earned it the nicknames “lady’s legs” and “naked Indian” from early settlers who first encountered the tree’s reddish tan bark.

Its natural range is limited to a small area of southeast New Mexico and isolated locations in Texas, then extends through Mexico and Guatemala. The common name “madrone” probably evolved from the Spanish name for the tree, *madroño*. This possibly comes from *madre*, which means mother or root. *Madroño* also refers to a berry-shaped tassel used to decorate Spanish military uniforms.

The madrone produces deep green, oval leaves, which by the end of the tree’s second or third year begin falling off to be replaced with new growth. Through the year, the tree’s smooth bark changes color from pink to red to white and splits and sheds in thin layers, almost like the shell of a shrimp. The root system resembles that of a blueberry bush, with large primary roots, many secondary roots, and no hair roots.

Like other *Arbutus* species, the Texas madrone produces a relatively hard wood, which is tight-grained and useful for



MARILYN HADDRILL

The bare, reddish tan bark of the Texas madrone led early settlers to nickname the tree “lady’s legs” and “naked Indian.”

Protects
plants from
transplant shock
and drought.



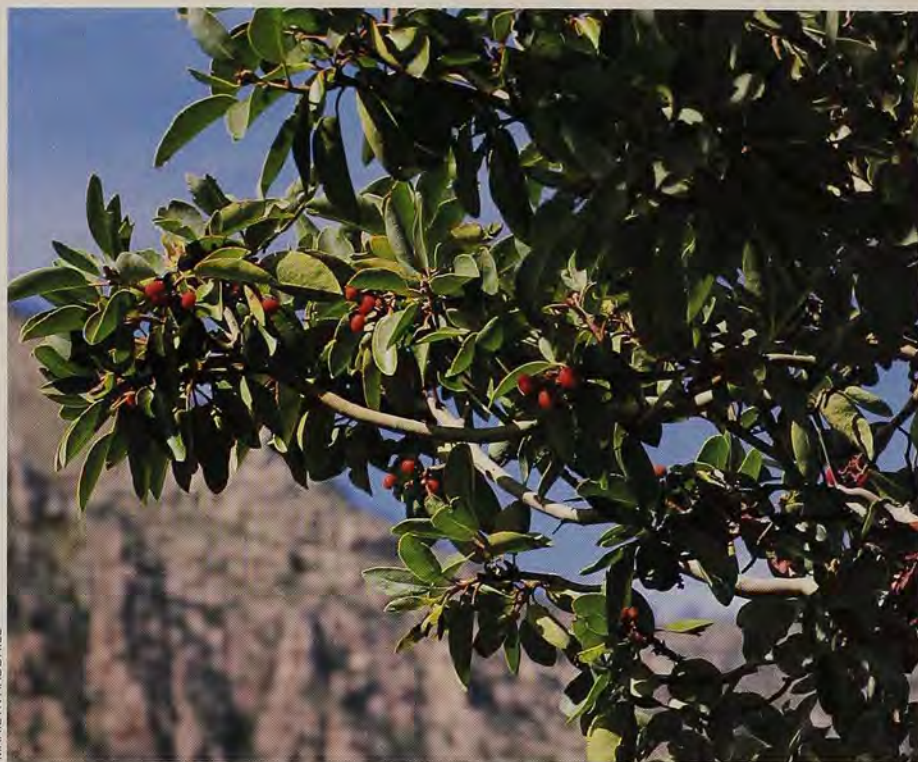
Sprayed on plant surfaces, Wilt-Pruf® forms a protective coating that slows down moisture evaporation from leaves and stems. Use for:

- spring and summer transplanting
- protection from summer heat and drought
- fall transplanting
- winter windburn protection
- Christmas trees, wreaths and greens

Organic and biodegradable, Wilt-Pruf® is the safe way to guard against moisture loss year 'round.

Ask for Wilt-Pruf® at your garden supply store today.

P.O. Box 469, Essex, CT 06426-0469
203/767-7033



MARILYN HADRILL

Arbutus xalapensis produces clusters of red to orange berries that are sweet but not as flavorful as more popular fruits.

making furniture, tools, handles, and cylinders. The wood is also burned for fuel and to make charcoal, which in turn has been used to make gunpowder. In Mexico, the bark and leaves are sometimes applied as an astringent. The berries of the Texas madrone are sweetish when ripe but not nearly as tasty as blueberries, for example. In southern Europe and Ireland the native and smaller *A. unedo* produces similar berries that are used in preserves and alcoholic drinks.

The largest known Texas madrone tree can be found in Big Bend National Park in southwest Texas; the evergreen measures thirty-two feet tall and has a trunk circumference of 112 inches. (While other Texas madrones have been known to grow taller—exceeding forty feet—the record size is determined by the American Forestry Association on a point system that also considers trunk diameter and branch spread.) Typically, the trees grow to twenty-five to thirty feet in the wild. Texas madrones thrive in limestone soil along arid hillsides and in canyons, although they have been found growing in acid soils in the Davis Mountains of Texas. Texas madrones are particularly abundant on the north slope of South McKittrick Canyon of Guadalupe Mountains National Park in west Texas, where the more protected soil retains moisture.

A cousin, *A. menziesii*, prefers West Coast habitats such as the acid soil and forest slopes of southern California where

moisture is abundant. It can also be found in British Columbia and in cultivation in Juneau, Alaska. *A. menziesii* can grow to more than twice the size of *A. xalapensis* and its fruit is dark red. Probably the closest relative of the Texas madrone is *A. arizonica*. This tree's range extends south from Arizona into Mexico; it also can be found in isolated areas of western New Mexico. *A. arizonica* tends to be slightly taller than Texas madrone, growing to forty-five feet, and produces flowers two to three months later, in May. Leaves, flowers, and fruits are basically the same for both trees.

For decades admirers of Texas madrone have been frustrated in attempts to transplant the stubborn plant from the wilds into gardens and yards. One notable exception can be seen on West Riverside Drive in Carlsbad, New Mexico. There, Stanley and Glenda Doyle own a large, spreading Texas madrone that was successfully transplanted about fifty years ago. It has become a celebrity of sorts, attracting tourists and researchers with its displays of creamy white to pink flowers in the spring and clustered berries that lure birds to its branches in the fall.

Now the Carlsbad Rotary Club wants to make the madrone a more familiar sight in the community, which is near the Guadalupe Mountains where the trees flourish. After finding a Texas nursery that has learned to cultivate the madrone, the club has been swamped with hundreds of orders

in an ongoing fund-raising project that involves selling madrone seedlings for transplant.

Dorothy Mattiza, owner-operator of Gunsight Mountain Ranch Nursery in Tarpley, Texas, near San Antonio, supplies the seedlings. She has noticed in recent years a sharp increase of public interest in the seedlings developed at her native plant nursery. "People who have seen them have almost instinctively wanted them. They are a distinctive tree. They're probably Texas's showiest evergreen," Mattiza said. "They're what has given us a little status as a nursery. We started out doing native plants, but no one paid any attention to us until they knew we had madrones. It was a unique idea." She says she knows of no other commercial operation selling Texas madrone seedlings, although potential competitors might now be entering the field.

Guadalupe Mountains National Park officials are enthused about the prospect of more widespread cultivation of the tree. They have noticed in recent years that the number of Texas madrones in native habitats seems to be declining, apparently because of environmental disturbance brought about by development.

The tree is uncommon in nurseries because it has an undeserved reputation for being difficult to cultivate, according to Texas A&M University horticulturist Benny J. Simpson, soil scientist Billy W. Hipp, and New Mexico State University woody plant physiologist Norman Lownds. Hardy to USDA Zone 7b, the plant is known to survive even when temperatures drop to near zero for several days. Because the madrone is drought-resistant, it is ideal for helping property owners to conserve water. Hipp and Simpson concluded from their research that *A. xalapensis* "should be a premier landscape tree for Texas" in areas as diverse as San Antonio and Corpus Christi.

Not only is it unethical to dig up wild trees, but nursery owner Mattiza says wild trees are almost impossible to transplant from their rocky soil because the roots don't adjust well to the disturbance. The seeds don't store well, but if they are planted soon after harvesting, they have a germination rate of better than 80 percent. Seed-grown trees transplanted to a proper location when only two feet tall, Mattiza says, thrive with little care after they become established. She sells her seedlings at six to eighteen inches tall and has ex-

perienced losses of less than 10 percent. "That's not a whole lot different than a lot of nurseries produce," according to Lownds.

Mattiza advises people buying seedlings to make sure the trees have proper drainage, since the evergreens are harmed by too much standing water. And since the plants are adapted to an arid environment, they don't adjust well to sprinklers. She suggests burying a plastic milk jug with a slit in the bottom alongside seedlings. Water and fertilizer can be poured into the jug to allow seepage below—but not above—the plant. The roots should never be allowed to dry out, nor should they be overwatered; a good mulching will help keep the soil moist enough. The plant also grows much better in a location providing afternoon shade. Mattiza says it's best not to try planting madrones in a location with high humidity, where they will be susceptible to fungi. Once planted, their growth rate depends on how suitable their habitat is. In the first few years, the seedlings might double or triple, depending on genetic structure and how well the roots set.

The unusual, colorful bark of this showy evergreen provides year-long interest in the home landscape. The tree has few insect problems, unless you count the butterflies that flock *en masse* to the nectar of its spring blossoms. Madrone berries are a winter food source for migrating birds, and in the summer, its large, leathery leaves create a refuge of cool shade that should attract most humans.

Marilyn Hadrill is the southern New Mexico correspondent for the El Paso Times and a free-lance writer living in Las Cruces, New Mexico.

SOURCES

Gunsight Mountain Ranch & Nursery, P.O. Box 86, Tarpley, TX 78883, (512) 562-3225. Catalog free.

Other *Arbutus* species are available from:

Greer Gardens, 1280 Goodpasture Island Road, Eugene, OR 97401, (503) 686-8266. *A. menziesii* seedlings. Catalog \$2.

Southwestern Native Seeds, P.O., Box 50503, Tucson, AZ 85703. *A. arizonica* seeds. Catalog \$1.

Thompson & Morgan, P.O. Box 1380, Jackson, NJ 08527, (201) 363-2225. *A. unedo* seeds. Catalog free.



Buy where the professionals buy!

Order the highest quality flower bulbs at the lowest prices from Van Engelen's Wholesale Price List for fall planting.

Send for your free catalog featuring:

- * Tulips
- * Daffodils
- * Exotic Bulbs
- * Crocus
- * Lilies
- * Hyacinths
- * Iris
- * Muscari
- * Paperwhites
- * Amaryllis

Special Offer:

100 Mammoth Darwin Hybrid Tulips

Top size, as large as 6" across, multi-colored tulips. Shipped by UPS for fall planting . . . Only \$19.95.

CT residents add 6% sales tax.

- Please send me a free catalog.
- Please send me 100 Mammoth Darwin Hybrid Tulips for \$19.95.
 - Payment enclosed: _____
 - Charge to: Master Card VISA

Acct. No.: _____

Exp. Date: _____

Name: _____

Mailing Address: _____

Shipping Address: _____

City: _____

State: _____ Zip: _____

Phone Number: _____

Van Engelen Inc.
 Stillbrook Farm
 313 Maple Street, Litchfield, CT 06759
 (203) 567-8734

BEAUTY FROM BULBS



Serving America's finest gardens for over 80 years.

John Scheepers, Inc. offers the most spectacular collection of flower bulbs to enhance your garden's beauty.

Send for FREE catalog

Send for your free color catalog featuring Holland's largest selection and finest quality of flower bulbs.

Name: _____

Street: _____

City: _____

State: _____ Zip code: _____



John Scheepers, Inc.
P.O. Box 700
Bantam, Connecticut 06750
(203) 567-0838



CLASSIFIEDS

Classified Ad Rates: \$1 per word; minimum \$20 per insertion. 10 percent discount for three consecutive ads using same copy, provided each insertion meets the \$20 minimum after taking discount. Copy and prepayment must be received on the 20th day of the month three months prior to publication date. Send orders to: American Horticultural Society Advertising Department, 2700 Prosperity Avenue, Fairfax, VA 22031, or call (703) 204-4636.

THE AVANT GARDENER

FOR THE GARDENER WHO WANTS MORE FROM GARDENING! Subscribe to THE AVANT GARDENER, the liveliest, most useful of all gardening publications. Every month this unique news service brings you the newest, most practical information on new plants, products, techniques, with sources, feature articles, special issues. 24th year. Awarded Garden Club of America and Massachusetts Horticultural Society medals. Curious? Sample copy \$1. Serious? \$12 full year (reg. \$18). THE AVANT GARDENER, Box 489M, New York, NY 10028.

AZALEAS AND RHODODENDRONS

FOR GARDENERS WHO CARE WHAT GOES WHERE: Carlson's Catalog and Color Cue Cards help create year-round, low maintenance Azalea and Rhododendron gardens. Two-year subscription: \$3. CARLSON'S GARDENS, Box 305-AHC, South Salem, NY 10590. (914) 763-5958.

BOOKS

TROPICA 4th edition, 1992, 7,000 color photos, 1,156 pages, \$165. Exotic House Plants, 1,200 photos, \$8.95. HORTICA, pictorial cyclopedia of Garden Flora and Indoor Plants, 8,100 color photos scheduled for Fall 1992. Shipping additional. Circulars gladly sent. ROEHR'S COMPANY, Box 125, E. Rutherford, NJ 07073.

BULBS

South African Gladiolus, Ixia, Babiana, Lachenalia, Amaryllids and other seeds and bulbs. Write for catalog to RUST-EN-VREDE NURSERY, P.O. Box 231, Constantia, Republic of South Africa 7848.

Dutch bulbs for fall planting, 12CM Tulips, DN1 Daffodils, Hyacinths and Miscellaneous. Catalog Free. Paula Parker DBA, Mary Mattison van Schaik, IMPORTED DUTCH BULBS, P.O. Box 32AH, Cavendish, VT 05142.

CACTI AND SUCCULENTS

FLOWERING JUNGLE CACTI catalog for 1991-1992 including 4-page 1992 plant addendum now available. 190 color photos of Orchid Cacti (Epiphyllums), Hoyas, Rattail Cacti, Xmas/Easter Cacti, Succulents, more! 77 page plant/cactus bookshop catalog, all only \$2. Hurry! RAINBOW GARDENS, 1444 (AH) Taylor St., Vista, CA 92084.

CARNIVOROUS PLANTS

Carnivorous (Insectivorous) Plants, seeds, supplies, and books. Color brochure free. PETER PAULS NURSERIES, Canandaigua, NY 14424.

DAYLILIES

AWARD-WINNING DAYLILIES—direct from grower! Beautiful catalog featuring 195 color illustrations: \$3 (\$5 coupon included). DAYLILY DISCOUNTERS, Rt. 2, Box 24AH, Alachua, FL 32615.

EXOTIC PLANTS

FREE PLUMERIA PLANT with minimum order!!! Easy-to-grow Tropicals. 300+ varieties! Plumerias, Hibiscus, Bougainvilleas, Gingers, Flowering Vines and Shrubs, Bulbs, Jasmines, Fragrant Plants. Books. NEW! Super Flower-producing specialty fertilizers. NEW! Plumeria Handbook (color), \$10.95. Beautiful descriptive catalog, 100+ color photos, \$2. PLUMERIA PEOPLE, Box 820014-AH, Houston, TX 77282-0014.

GARDEN FURNITURE

ENGLISH REGENCY STYLE. Carefully hand-forged. Entirely hand-riveted. Direct from blacksmith. Legal SASE for brochure to F.B. ODELL, 6209 Upper York Rd., New Hope, PA 18938.

HELP WANTED

We at the American Horticultural Society are often asked to refer individuals to significant horticultural positions around the country. We are not in a position to offer full placement services to candidates or employers. However, as a service to our members—jobseekers and employers alike—we would be very glad to receive résumés and cover letters of individuals seeking job changes and employers seeking candidates. All responsibility for checking references and determining the appropriateness of both position and candidate rests with the individuals. AHS's participation in this activity is only to serve as a connecting point for members of the Society. Inquiries and informational materials should be sent to: Horticultural Employment, American Horticultural Society, 7931 East Boulevard Dr., Alexandria, VA 22308-1300.

Give yourself extra clout with the American Horticultural Society MasterCard®



Carry the credit card that gives you the recognition of being a caring, active member of the American Horticultural Society. This is the only card that enables you to add your support to your favorite non-profit organization! Accepted at 9 million locations worldwide, the AHS Gold MasterCard® card gives you unmatched traveling, shopping and entertaining convenience.

Get these extra advantages at NO RISK!

- No annual fee for the first year (\$40 for the Gold card, \$20 for the Silver card thereafter; 17.9% Annual Percentage Rate)*
- Up to \$50,000 line of credit
- Immediate cash availability
- Toll free access to 24-hour Customer Service department
- Credit card registration service

Extensive travel benefits and services including*:

- Up to \$1,000,000 Common Carrier Travel Accident Insurance*
- Supplemental Auto Rental Collision/Loss Damage Insurance
- Up to \$3,000 Supplemental Lost Checked Luggage Protection
- Emergency Cash & Airline Tickets

This plastic passport, recognized around the world, is being offered exclusively to AHS members and their families. "AHS is making this card available because it has the power, practicality and prestige of a premium MasterCard," explained Darlene Oliver, AHS Director of Membership. "And, each time you make a purchase with your AHS MasterCard, you add support to AHS programs – at no cost to you!"

Why not make this card the one you reach for when shopping for gardening supplies, dining at a favorite restaurant, purchasing travel tickets or checking into a hotel? Choose the card that makes a difference.

CALL NOW TO APPLY

24 hours a day, 7 days a week

1-800-847-7378, ext. 5000

Be sure to use the priority code when calling: PXKK.

Transaction Fee For Bank and ATM Cash Advances: 2% of each Cash Advance (\$2 Minimum, \$25 Maximum); Transaction Fee For Premium Access Check Cash Advances: 1% of each Cash Advance (\$2 Minimum, \$10 Maximum). Late Payment Fee: \$15. Over-the-Credit-Limit-Fee: \$15.

Certain restrictions apply to these benefits. The summary of credit card benefits accompanying the credit card Premium Access Checks describes coverage terms, conditions and limitations. MBNA America* and Premium Access Checks* are federally registered Service Marks of MBNA America Bank, N.A. The account is issued and administered by MBNA America Bank, N.A. MasterCard® is a federally registered Service Mark of MasterCard International, Inc., used pursuant to license. The information about the cost of the card described above is accurate as of 5/92, to find out what may have changed call 1-800-847-7378 ext. 5000.

ENERGY-SAVING
SUN-PORCH™
CONVERTIBLE
SUNSPACE
More value for less money!

INSULATED
WINTER SUN SPACE CONVERTS
TO A SUMMER SCREEN ROOM!



MOUNTS
READILY ON
DECKS, PATIOS,
OR LANDSCAPE
TIES

Choice of stunning Opal White or Bronze-Tint glazings on white or bronze framework QWIK™ window/screen change system Do-it-yourself assembly America's #1 value.

Send \$2 for Color Catalogues, Prices, SENT FIRST CLASS MAIL.
 Dealer Inquiries Welcome

SUNBEAM
STRUCTURES
DIVISION

VEGETABLE FACTORY, INC.
 P.O. Box 1353, Dept. AHO
 Stamford, CT 06904-1353

HOUSE PLANTS

ORCHIDS, GESNERIADS, BEGONIAS, CACTI & SUCCULENTS. Visitors welcome. 1992-1993 catalog \$2. LAURAY OF SALISBURY, 432 Undermountain Rd., Salisbury, CT 06068. (203) 435-2263.

ORCHIDS—for windowsill, under lights or greenhouse. Affordable \$12-\$20. Blooming size! Listings w/cultural info. \$2 refundable. Palestine Orchids, Rt. 1, Box 312A, Palestine, WV 26160.

FREE "The Five Professional Secrets of Healthy House Plants." A Walsh Report Newsletter. Write Edward Walsh Professional Horticulturist, P.O. Box 430, Lansdowne, PA 19050.

PERENNIALS

DISTINCTIVE, FIELD-GROWN PERENNIALS—"Simply the Newest & Best Cultivars!" Specializing in Japanese & Siberian Irises, Uncommon Hostas and Choice Daylilies. FREE Fall Sales Listing. YORK HILL FARM, 271 N. Haverhill Rd., Kensington, NH 03833.

PLANTS (UNUSUAL)

OVER 2,000 KINDS of choice and affordable plants. Outstanding ornamentals, American natives, perennials, rare conifers, pre-bonsai, wildlife plants, much more. Descriptive catalog \$3. FORESTFARM, 990 Tetherhasl, Williams, OR 97544.

Rocky Mountain and Great Basin native plants, cold hardy eucalyptus, and Australian plants. For current Plants Price list send SASE to AUSTRALIA FLORA OF UTAH, 3816 Highland Dr., Holladay, UT 84106.

RARE AND EXOTIC TROPICALS

RARE & EXOTIC TROPICALS for home and garden. Plant collector's paradise. 84-page colorful catalog \$5. SOUTHERN EXPOSURE, 35 Minor-AH, Beaumont, TX 77702-2414.

ROSES

LARGEST ASSORTMENT OF ROSES to be found anywhere, at reasonable prices: HT, climbers, antiques, English Garden Roses, Rennie's miniatures, Cocker's introductions, etc. A superb collection. Most orders shipped in our refrigerated truck to USA UPS depots for distribution. Catalog \$2. HORTICO INC., Fax (416) 689-6566.

VIBURNUMS

VIBURNUMS FOR PATIO OR PARTERRE. Large selection of these and other ornamental trees and shrubs. Please send \$2 for descriptive catalog. FAIRWEATHER GARDENS, Box 330-Greenwich, NJ 08323.

CREATIVE GARDEN TOURS

An unforgettable experience awaits!

We custom-design unique flower and garden tours worldwide for Horticultural Societies, Garden Clubs, professional and non-profit organizations. Call us now to plan a special trip for your group.

1-800-262-9682

X.O. TRAVEL
CONSULTANTS, LTD.

X.O. Travel Consultants Ltd.
 38 West 32nd Street, Suite 1009
 New York, NY 10001
 Telephone: (212) 947-5530
 Telex: 4955784
 FAX: (212) 971-0924



NEW BOOKS

JUST ARRIVED!

THE NEW RHS DICTIONARY OF GARDENING

ANTHONY HUXLEY, EDITOR-IN-CHIEF

One of the most important horticultural reference works published in decades, with four volumes and 3,000 pages, *The New RHS Dictionary of Gardening* describes over 50,000 plants from around the world and contains 4,000 original illustrations and extensive cultivation notes accompanying the botanical and taxonomic data. Also included are 180 essay-length articles covering garden history, garden design, gardening techniques, and special interest topics such as ethnobotany and xeriscaping. The dictionary features such special reference sections as a glossary of pests, diseases, and disorders, an index of popular names; a glossary of horticultural terms and plant taxonomy; and an illustrated botanical glossary.



Illustration of Acer species from The New RHS Dictionary of Gardening, a four-volume, illustrated reference guide with extensive cultivation notes and 180 garden essays.

Now available from the American Horticultural Society for \$745—\$50 off the regular retail price—plus \$20 shipping for all four volumes.

To order *The New RHS Dictionary of Gardening*, fill in the coupon below and mail it to: AHS Books, 7931 East Boulevard Drive, Alexandria, VA 22308-1300. Or call toll-free: (800) 777-7931.

Check enclosed

Name: _____

Charge my:

Address: _____

Visa MasterCard Exp. Date: _____

City: _____

Account #: _____

State / Zip: _____

Signature: _____

Daytime Phone: _____



STUDY TOURS

TRAVEL/STUDY TRIPS FOR THE AHS GARDENER

AUGUST 8-19, 1992 GARDENS OF FRANCE

This will be a most unusual exploration of the great private gardens of the French regions of Brittany and Normandy. Here you will find gardens ranging in style from Prince Wolkonsky's Mediterranean terraces in Keraldo to Princess Sturzda's wonderful use of ground covers at Le Vesterival. You will find each garden different, yet the incomparable French style has been used throughout to provide accommodating homes for many rare species of trees, shrubs, and other plants. Leading this program will be long-time AHS Board Member Richard Angino.

OCTOBER 20-NOVEMBER 11, 1992 SPRING GARDENS OF AUSTRALIA AND NEW ZEALAND

This unique itinerary affords the opportunity to visit a number of superb private gardens, including Mr. and Mrs. Malcolm McConnell's country garden in Auckland, Mr. and Mrs. John Tynegrove's garden rooms in Christchurch, and the Canberra home garden of Mrs. Peter G. Park, author of *The World is My Garden*. The itinerary includes the North and South Islands of New Zealand along with an excursion to Milford Sound. In Australia, tour participants will visit Sydney, Canberra, and Melbourne. The program is led by Andre and Claire Viette. Mr. Viette is a long-time AHS Board Member and a distinguished author and lecturer in the field of horticulture.

NOVEMBER 14-21, 1992 GARDENS OF THE ANTEBELLUM SOUTH

Join us for an exceptional voyage of exploration on board the yachtlike *Nantucket Clipper* for seven days from Charleston, South Carolina, to Jacksonville, Florida. Ports of call will include Savannah, Hilton Head, Beaufort, and St. Simons Island. We'll see restored and new gardens created by garden designers Louisa Wood and Lou Trell Briggs, along with a marvelous selection of private gardens, including the Charleston gardens of James Morton, featured in *A View from the Window* by Heather Angel, and Emily Waley's garden, featured in *The American Woman's Garden* by Rosemary Verey and Ellen Samuels. The program is led by Everett L. Miller and his wife Cass. Mr. Miller is a Past President of AHS and former director of Longwood Gardens.

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

Tour participants will visit Vaux le Vicomte during an August trip to the French regions of Brittany and Normandy.

PHOTO COURTESY OF THE FRENCH GOVERNMENT TOURIST OFFICE



PRONUNCIATIONS

- Acacia armata* ak-KAY-see-uh ar-MAY-tuh
A. constricta A. kon-STRIK-tuh
Aconitum noveboracense ak-oh-NYE-tum
no-vee-bore-ass-EN-see
Aesculus turbinata ESS-kew-lus
tur-bih-NAY-tuh
Agalinis acuta ag-uh-LIE-niss ak-KEW-ruh
Agave americana uh-GAY-vee
uh-mer-ih-KAY-nuh
Aloe al-OH-ee
Amorphophallus titanum
uh-mor-foe-FAL-us tie-TAN-um
Anagallis monelli subsp. *linifolia*
an-ah-GAL-iss moe-NEL-ee subsp.
lie-nih-FOE-lee-uh
Andropogon scoparius an-dro-POE-gon
sko-PAIR-ee-us
Angraecum sesquipedale an-GREE-kum
ses-kwih-ped-DAY-lee
Arbutus arizonica arb-YEW-tus
ar-ih-ZON-ih-kuh
A. menziesii A. men-ZEE-see-eye
A. unedo A. ew-NEE-doe
A. xalapensis A. zal-uh-PEN-sis
Argemone ar-JEM-oh-nee
Arisaema dracontium ar-ih-SEE-muh
dra-KON-tee-um
Aristolochia californica ah-ris-toe-LOW-kee-uh
kal-ih-FORN-ih-kuh
A. clematitis A. klem-uh-TIE-tiss
Asparagus densiflorus ass-PAIR-uh-gus
den-sih-FLOR-us
A. falcatus A. fal-KAY-tus
Aster novae-angliae ASS-ter NO-vee-AN-glih-ee
Astragalus ass-TRAG-uh-lus
Berberis BER-ber-iss
Betula murrayana BET-yew-luh
mew-ray-AY-nuh
Bougainvillea boo-gun-VIL-ee-uh
Brunnera macrophylla BRUN-air-uh
mak-roe-FIL-uh
Callistephus chinensis kal-LISS-stef-us
chih-NEN-sis
Calopogon pulchellus kal-oh-POE-gon
pull-KEL-us
Carissa grandiflora kuh-RISS-uh
grand-ih-FLOR-uh
Catsetum kat-uh-SEE-tum
Celosia cristata sel-OH-see-uh kriss-TAY-tuh
C. plumosa C. plew-MOE-suh
Centaurea cyanus sen-taw-REE-uh
sigh-AY-nus
Cephalanthera longifolia
sef-uh-lan-THAIR-uh lon-jih-FOE-lee-uh
Chaenomeles speciosa kee-NOM-el-eez
spee-see-oh-suh
Cirsium pitcheri SIR-see-um pih-CHAIR-ee
Cistus salvifolius SIS-tus sal-vih-FOE-lee-us
Citrus SIH-truss
Cleome hasslerana klee-OH-mee
hass-lee-RAY-nuh
Collinsonia verticillata kol-in-SO-nee-uh
ver-tih-sih-LAY-tuh
Consolida ambigua kon-SOL-ih-duh
am-BIG-yew-uh
Coryanthes ko-ree-AN-theez
Corylus avellana KOR-ih-liss av-el-LAY-nuh
Cosmos bipinnatus KOZ-mose
bye-pin-NAY-tus
C. sulphureus C. sul-FEW-ree-us
Crataegus crus-galli krah-TEEG-us
KREWS-GAL-lee
Cucurbita kew-KER-bit-uh
× *Cupressocypris leylandii*
× kew-press-oh-sigh-PAIR-us lee-LAND-dee-eye
Cynoglossom amabile sin-oh-GLOSS-um
uh-MAB-ih-lee
Dianthus chinensis die-AN-thus chih-NEN-sis
Digitalis dih-jih-TAL-iss
Drakaea fitzgeraldii DRAK-ee-uh
fits-jer-AWL-dee-eye
Echinocactus grusonii ek-ih-no-KAK-tus
grew-SONE-ee-eye
Echinops exaltatus EK-ih-nops eks-al-TAY-tus
Euphorbia milii yew-FORB-ee-uh MIL-ee-eye
Ficus sycomorus FYE-kus sik-oh-MORE-us
Fouquieria splendens foo-key-AIR-ee-uh
SPLEN-denz
Gomphrena globosa gom-FREE-nuh
glow-BO-suh
Gongora gon-GO-ruh
Heliotropium arborescens
hee-lee-oh-TROW-pee-um ar-bo-RESS-enz
Helipterum hee-LIP-ter-um
Hunnemannia fumariifolia
hun-eh-MAN-ee-uh foo-mar-ee-eye-FOE-lee-uh
Hymenoxys acaulis var. *glabra*
high-men-OKS-iss uh-KAWL-iss var.
GLAY-bruh
Iliamna corei il-ee-AM-nuh KOR-ee-eye
Ilex cornuta EYE-leks kor-NEW-tuh
Juniperus horizontalis jew-NIP-er-us
hor-ih-zon-TAY-liss
J. pfitzeriana J. fits-zer-ee-AY-nuh
J. procumbens J. pro-KUM-benz
Lantana montevidensis lan-TAY-nuh
mon-teh-vih-DEN-sis
Lathyrus odoratus LATH-ir-us oh-doe-RAY-tus
Lavatera trimestris lav-ah-TEER-uh
try-MESS-triss
Limonium lih-MOE-nee-um
Linum grandiflorum var. *rubrum* LIE-num
grand-ih-FLOR-um var. ROOB-rum
Lupinus texensis lew-PIE-nus teks-EN-sis
Lysimachia vulgaris lie-sih-MAY-kee-uh
vul-GAY-riss
Macadamia integrifolia
mak-uh-DAY-mee-uh in-teg-rih-FOE-lee-uh
Maclura pomifera mak-LURE-uh pom-IF-er-uh
Mahonia mah-HOE-nee-uh
Nemophila menziesii nee-MOF-il-uh
men-ZEES-ee-eye
Nigella damascena nye-JEL-uh
dam-ass-SEE-nuh
Nothofagus noth-oh-FAY-gus
Opuntia oh-PUN-tee-uh
Oxypetalum caeruleum oks-ee-PET-uh-lum
see-REW-lee-um
Papaver rhoeas pah-PAY-ver REE-us
P. somniferum P. som-NIF-er-um
Pediocactus knowltonii peh-dee-oh-KAK-tus
nol-TOE-nee-eye
Phacelia campanularia fas-EE-lee-uh
kam-pan-yew-LAIR-ee-uh
Phyllitis scolopendrium fil-LIE-tiss
sko-low-PEN-dree-um
Pinus PIE-nus
Poncirus trifoliata pon-SIGH-rus
try-foe-lee-AY-tuh
Prunus americana PRUNE-us
uh-mer-ih-KAY-nuh
P. angustifolia P. an-gus-tih-FOE-lee-uh
Pseudotsuga menziesii soo-doe-TSOO-guh
men-ZEES-ee-eye
Pterostylis ter-oh-STY-liss
Punica granatum PEW-nik-uh gra-NAY-tum
Pyraecantha pie-ruh-KAN-thuh
Reseda odorata reh-SEE-duh oh-doe-RAY-tuh
Ribes speciosum RYE-beez spee-see-OH-sum
Rosa eglanteria ROW-suh eg-lan-TARE-ee-uh
R. foetida R. FEE-tid-uh
R. rugosa R. rew-GO-suh
Rubus REW-bus
Salvia atropurpurea SAL-vee-uh
at-row-per-PEW-ree-uh
S. farinacea S. far-ih-NAY-see-uh
S. patens S. PAY-tenz
S. viridis S. VIH-rid-us
Sarracenia oreophila sar-ah-SEN-ee-uh
or-ee-oh-FIL-uh
Scabiosa skab-ee-OH-suh
Silybum marianum SIL-ih-bum mar-ee-AN-um
Solidago canadensis sol-ih-DAY-go
kan-uh-DEN-sis
Stanhopea stan-HOE-pee-uh
Stephanomeria malheurensis
stef-an-oh-MEER-ee-uh mal-hewr-EN-sis
Taxus baccata TAKS-us bak-KAY-tuh
T. brevifolia T. brev-ih-FOE-lee-uh
Trollius laxus subsp. *laxus* TROE-lee-us
LAKS-us subsp. LAKS-us
Verbascum ver-BASS-kum
Verbena bonariensis ver-BEE-nuh
bo-nar-ee-EN-sis
V. hybrida V. HIGH-brid-uh
Yucca aloifolia YUK-uh al-oh-ih-FOE-lee-uh

MAYBE WHAT YOUR SOIL NEEDS IS MORE IRON.



When it comes to making a garden tractor tough, nothing beats cast iron. That's why we build every Toro Wheel Horse garden tractor with a cast-iron front axle, cast-iron transmission housing and cast-iron cylinders. Not to mention case-hardened steel gears and a steel beam frame. So before you choose your next garden tractor, test ride this one. It'll make a tough decision a lot easier.





Is Something Missing From Your Garden?

Is your garden missing jewel-like flowers floating on a shimmering water surface and the darting brilliance of goldfish? Are you missing the melodic sounds of water spilling from a fountain, vessel or waterfall?

If you haven't one, you are missing a great deal of satisfaction from your garden.

What you need in your garden is a water lily pool. A water lily pool is a garden whose plants like damp to very wet feet. Fish and frogs like to live there and butterflies will like your garden better than ever. A water garden is simply one of the most satisfying forms of gardening.

Let Lilypons and TetraPond help you to get started today by ordering one of our durable TetraPond 32 mil, flexible, 2 ply PVC pool liners. So easy to install and maintain you will ask yourself why you waited so long to begin this adventure. Call toll free to nearest location. Please have credit card information handy.

Choose from the seven sizes listed (sizes are approximate) for depth 18" to 24" in your own design.

Lilypons catalogue subscription (<i>Free with liner order</i>)	\$ 5	13' x 20' liner makes 9' x 16' pool	\$ 229
8' x 12' liner makes 4' x 8' pool	99	16' x 23' liner makes 12' x 19' pool	299
10' x 16' liner makes 6' x 12' pool	149	20' x 26' liner makes 16' x 22' pool	399
13' x 13' liner makes 9' x 9' pool	165	23' x 30' liner makes 19' x 26' pool	499

Use your personal check or circle credit card: Discover VISA MasterCard American Express

Card Number _____ Expiration Date _____

Name _____ Address _____

City _____ State _____ Zip _____ Phone () _____

California (7.75), Maryland (5%), and Texas (7.25%) residents please add sales tax.

Lilypons Water Gardens.

Dept. 1526
P.O. Box 10
Buckeystown, Maryland 21717-0010
800-723-7667 Washington Local 428-0686

Dept. 1526
P. O. Box 188
Brookshire, Texas 77423-0188
800-766-5648 Houston Local 391-0076

Dept. 1526
P. O. Box 1130
Thermal, California 92274-1130
800-685-7667