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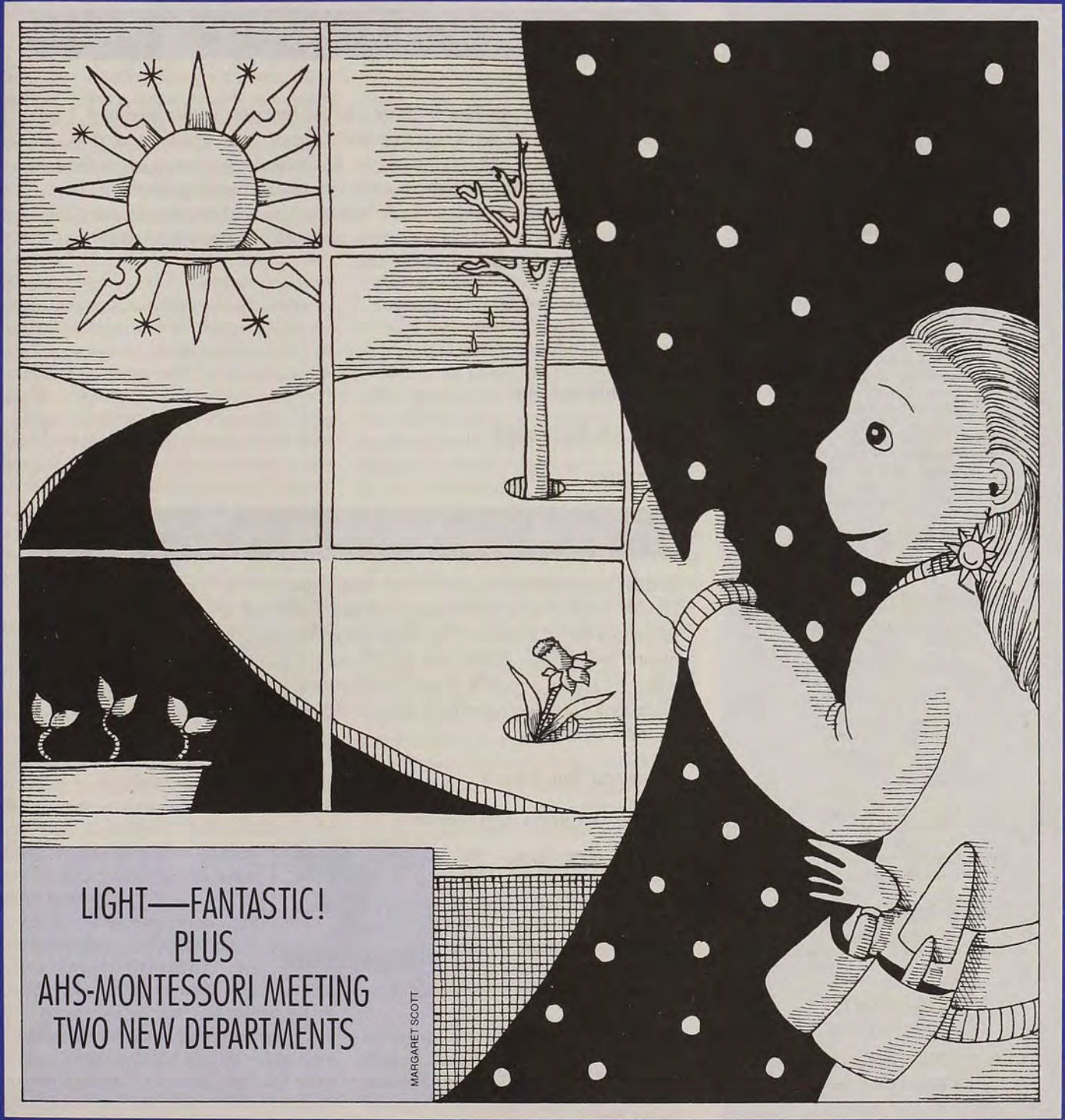

LIGHT—FANTASTIC!
PLUS
AHS-MONTESSORI MEETING
TWO NEW DEPARTMENTS

MARGARET SCOTT

American Horticulturist

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ARTICLES

Light—Fantastic!
At this time of year, as days lengthen and we fuss over tender seedlings while waiting for the sun's rays to rewarm the earth, it would be hard to ignore the effects of light on our plants' health and vigor. As much as their need for water, a need for light in some amount is crucial to all plants. In this issue, we'll revisit the basics of photosynthesis and day length, consider the role pigments play in plant growth, and look at plant shadows as another aspect of gardening aesthetics.

DEPARTMENTS

In this issue we introduce two more new departments. "Plants and Your Health" will cover a wide range of topics, from new discoveries about the medicinal use of plants to the impact of gardening on our physical and mental well-being—most often beneficial, but sometimes detrimental, as when we sprain a muscle or encounter poison ivy. "Conservationists' Notebook" will look at efforts around the country to protect plants and their environments.

PLANTS AND YOUR HEALTH

Silk Purslane or Sow's Ear?

If you garden, you're probably growing purslane—whether you like it or not. Most gardeners don't, but it's nearly impossible to uproot all those flat clumps of succulent, reddish stems with their tiny spoon-shaped leaves. In his famous gardening encyclopedia, Donald Wyman called *Portulaca oleracea* "probably the worst weed troubling all gardeners throughout the U.S. and Canada." *The World's Worst Weeds*, a survey published in 1977, celebrates purslane as an international agricultural nuisance. But James Duke, an ethnobotanist with the U.S. Department of Agriculture and an authority on edible wild plants, sees purslane as a weed with potential.

Duke explains that purslane has long had a role in the pharmacopoeias of other cultures. The Chinese use it to treat a host of ailments, including anthrax, herpes, snake-bite, and tumors. In India, purslane is prescribed for piles, asthma, and leprosy. Native American cultures have resorted to it for earache, burns, and worms.

Now mainstream medicine is taking an interest in purslane as well, because the plant was found to contain very high levels of omega-3 fatty acids. Best known as constituents of fish oils, omega-3s are thought to greatly reduce the harmful effects of cholesterol. Some nutritionists believe omega-3s can help fight a vast assortment of other ills too, including acne, herpes, schizophrenia, obesity, and cancer. Duke says omega-3s constitute about 8 percent of purslane's dried weight—a higher concentration than known in any other leafy vegetable.

Purslane has other assets. "It's one of the best sources I know of for tocopherol (vitamin E)," says Duke. "The USDA recently said it's virtually impossible to get 20 milligrams of tocopherol without supplementing. A cup of dry purslane could contain more than 200 milligrams." Purslane also has large amounts of beta-carotene. "Doctors pushing Roche beta-carotene tell us that 50 milligrams every other day will prevent the second heart attack," says Duke, referring to a formulation from the giant drug company. "One cup of dry purslane contains nearly 10 times that amount."

Vitamin E, beta-carotene, and some of purslane's other components are anti-oxidants. These reduce our exposure to free radicals—charged particles that damage cell membranes and may cause cancer. Anti-oxidants help purslane succeed as a weed: they disarm many herbicides.

Perhaps the most remarkable ingredient in purslane's chemical makeup is nor-epinephrine, a stimulant of the adrenal glands. Duke knows of no other readily available edible plant that contains the chemical. Nor-epinephrine is used to treat shock; for instance, it's the active ingredient in the bee sting kits used by people with severe allergies to insect venom.

Duke isn't unreservedly enthusiastic about purslane's culinary potential. If you decide to regard this year's purslane as a crop instead of a weed, he recommends eating young shoots as a salad green or cooked like spinach; the older ones can be fibrous. He describes the potherb as tasting like "slimy spinach." To improve the texture he suggests adding egg and breadcrumbs or using purslane in soups, "where the mucilaginous texture might be appreciated."

Duke cautions against becoming a "purslamaniac." All edible higher plants probably contain some valuable nutrients—beta-carotene, for instance, is only one of some 500 carotenoids that plants produce. Many of these may play a role in human nutrition too. So eat widely in the plant kingdom, or as Duke likes to say, "moderation in all things except variety." —*Chris Bright*
Assistant Editor

Duke's Handbook of Edible Weeds *is available at for $21.20 from the American Horticultural Society Book program.*

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GARDENERS' INFORMATION SERVICE

Q: ***Gypsy moths have killed many of the trees in my neighborhood. Before I begin to replant, can you tell me what trees are resistant to gypsy moths? —F. D., Springfield, Pennsylvania***

A: According to Diane Relf, an extension specialist in the horticulture department at Virginia Polytechnic Institute, the following are the gypsy moths' least preferred trees: fraser fir (*Abies fraseri*), ash (*Fraxinus* spp.), American holly (*Ilex opaca*), Eastern red cedar (*Juniperus virginiana*), tulip tree (*Liriodendron tulipifera*), red mulberry (*Morus rubra*), red spruce (*Picea rubens*), Scotch pine (*Pinus sylvestris*), American sycamore (*Platanus occidentalis*), and black locust (*Robinia pseudoacacia*).

You might also want to take note that the trees *most* preferred by gypsy moths include alder, apple, American basswood, boxelder, hawthorn, paper birch, sweetgum, tamarack, willow, and above all, oak trees.

To further help control the gypsy moth's spread, learn to identify the moth in all its stages so you'll know when to band your trees with burlap and apply *Bacillus thuringiensis* insecticide for maximum effectiveness. For more detailed control information for your region, contact your local Cooperative Extension's gypsy moth management program.

Q: ***I have heard that there are ways to landscape property to reduce damage by wildfires. What can you tell me about this? —J.R., Santa Cruz, California***

A: Those who live in fire-prone areas can design their entire landscape to act as a firebreak. If you have the resources, a two-foot-tall decorative stone garden wall—free of vegetation and about 30 feet away from your home—is an excellent barrier.

Don't plant shrubs within 15 feet of a structure; it's even better to keep any flammable vegetation outside a 30-foot radius. Keep grass mowed very low and rake up grass clippings, moss, abandoned nests, and dead limbs.

Conifers are especially fire-prone and should probably be avoided unless you have a very big lot. Keep the limbs of any trees 15 to 20 feet apart to avoid creating a continuous canopy that would allow fire to spread easily from tree to tree. To keep grass fires from spreading into trees, prune out all limbs within 15 to 20 feet of the ground and remove small trees or shrubs planted under large trees. Regularly remove all dead branches and leaves.

Also remove leaves, pine needles, moss, and twigs from roofs or eaves. (Even those not living in high-risk areas should remove tree limbs that grow over a roof or against walls of a structure, or within 15 feet of a chimney.)

During very dry periods, thoroughly water all vegetation near your home. An irrigation system is a good investment.

For trees to be planted within 100 feet of a structure, the Theodore Payne Foundation for Wildflowers and Native Plants in California suggests oak, citrus, alder, macadamia, maple, sycamore, ironwood, redbud, and buckeye.

For medium-sized shrubs, the foundation highly recommends members of the *Atriplex* genus (salt bush or quail bush), an attractive silvery-leaved plant noted for its fire resistance. It can be pruned low to the ground each year to reduce fuel buildup. Other recommended mid-sized shrubs or small trees are lilacs such as *Syringa* 'Santa Ana', 'Concha', and 'Joyce Coulter', the pomegranate cultivar *Punica granatum* 'Nana', currant species such as *Ribes viburnifolium,* red-twig dogwoods, hollies, mahonias, monkeyflowers (*Mimulus* spp.), redbuds, and the manzanita cultivars *Arctostaphylos densiflora* 'Howard McMinn' and 'Sentinel'. Yuccas are another nonflammable choice; *Yucca whipplei* is especially attractive.

Ground covers that will deter erosion on slopes while providing little flammable fuel include bearberry, prostrate coyote bush (*Baccharis pilularis*), *Ceanothus* 'Yankee Point', and low-growing varieties of sage and artemisia. Other choices among herbaceous flowering plants might be annual wildflowers such as poppies, lupines, tidytips, clarkias, phacelias, or perennials such as daylilies, red-hot poker (*Kniphofia uvaria*), agapanthus, sea pinks (*Armeria maritima*), and penstemons.

For more information, contact the Theodore Payne Foundation: 10459 Tuxford Street, Sun Valley, CA 91352.

Q: ***I transplanted two Japanese beautyberry bushes from my mother's mid-Massachusetts garden to my southern Connecticut garden five years ago. They have grown larger and developed a lot of foliage but no flowers. Can you tell me why? —E.S., Niantic, Connecticut***

A: *Callicarpa japonica* is a shrub that usually transplants successfully. These round bushy shrubs with striking purple fall berries prefer well-aerated soil and full sun to light shade. If your plant is in a very shady spot, you should move it to an area with more sun.

Beautyberries produce flowers on the new growth. To encourage new growth, prune yours in early spring to within four

USE YOUR GIS

The American Horticultural Society's Gardeners' Information Service has developed informational materials that explore more than 30 gardening subjects, including butterfly gardening, xeriscaping, moss gardening, organic fertilizers, soil preparation, children's gardening resources, state lists of public gardens, and plant sources. Prices for the bulletins range from 50 cents to $6.

To receive a complete list of GIS publications send a SASE to GIS Catalog, 7931 East Boulevard Drive, Alexandria, VA 22308-1300.

to six inches of the ground.

Another problem may be overly fertile soil. If you have been fertilizing, either with compost or chemical fertilizers, stop for a while.

Finally, either excessive moisture or protracted drought can hinder flower development. Lack of water at critical times, especially during flower bud development in late summer, can slow vegetative growth and affect flower bud initiation. Overwatering can sometimes stimulate excessive vegetative growth at the expense of flower development.

Q: *Can I transplant azaleas in early spring before they bloom? — M. C., Scranton, Pennsylvania*

A: Azaleas can be easily transplanted in mild weather as long as the new planting area has the conditions they need to thrive: acidic soil (pH 4.5 to 6.5), moisture, shade, mulch, and protection from excessive wind. Dig as large a rootball as you can around the plant so as not to disturb its root structure when you're lifting it out. Once transplanted, make sure it's well watered, and it should put on a spring flower show in its new location.

Q: *The stalks of my rhubarb plant are getting smaller and tougher tasting each year. What should I do to get them larger and better tasting? —G.C., Bronxville, New York*

A: If your plants have been growing in the same area for a number of years, they are probably just getting tired and need dividing so the roots and stalks have better growing conditions.

Dig and divide the rhubarb plants in early spring and remove any dead or diseased-looking roots. Prepare new planting-bed areas for them by working compost into the soil. Rhubarb thrives in an acidic, well-aerated soil rich in organic matter. Plant the divided sections about three inches deep and about three feet apart. Make sure the bed is well watered and weeded. You can begin to harvest stalks again the second year after transplanting. Never harvest more than half of the plant's stalks at one time, since this can decrease the overall vigor of the plant. Removing flowers as they develop will also increase vegetative growth.

Don't transplant your rhubarb to a site where strawberries, tomatoes, or peppers have been grown, since those plants, like rhubarb, are susceptible to verticillium wilt.

—Maureen Heffernan
Education Coordinator

MAIL-ORDER EXPLORER

The Fruits of Adversity

To hear Guy Ames tell it, the Ozark Mountains aren't exactly a fruit grower's paradise. "We get these northern blasts from off the Great Plains in winter," he says. "But we're part of the South too, so we have all that heat and humidity in the summer, and our soil is really acidic and shallow." The Ozarks are also home to just about every major orchard pest on the eastern half of the continent. But Ames' Orchard and Nursery is thriving in spite of it all. Or rather, Ames says, because of it all. Ames focuses on hardy, disease-resistant trees, suitable for low-spray programs. He's not in the habit of taking anyone else's word about hardiness and, given his Ozark setting, he doesn't have to. "We know in just a season or two whether something is really hardy," he says. And that explains the nursery's motto: "Fruit for the Ozarks probably means fruit for you."

Guy and Carolyn Ames started planting an orchard for themselves in 1980. "But we had greater success with the grafting than I anticipated," says Ames. "So we started asking friends and neighbors if they wanted trees." Today the nursery, on the northern edge of USDA Zone 6, sells 29 varieties of apples, both modern and antique, as well as smaller selections of pears, peaches, Japanese plums, grapes, and berries. All trees are propagated on the premises and shipped bare-root. The nursery serves a broad customer base, including homesteaders, suburbanites, small-scale commercial orchardists, and university and private researchers.

The business is built around what Ames calls "the intense handwork" of budding and grafting. But the Ameses are nursery hands with serious credentials. Both have master's degrees in horticulture from the University of Arkansas. Carolyn has managed propagation programs for two gardens and another nursery. Guy has written numerous articles on fruit growing, in both popular and technical journals, and is a technical specialist with the U.S. Fish and Wildlife Service's ATTRA (Appropriate Technology Transfer for Rural Areas) program, where he advises growers on low-input fruit culture.

Ames practices what he preaches. An ordinary commercial apple operation may spray pesticides more than 20 times a year. But the Ameses spray their orchard just twice a year, and still produce a crop that is 95 percent free of insect damage.

Low-spray programs should begin with trees that are as resistant as possible to local pests. The Ames catalog is designed to help customers understand what that means for their region, and the Ameses don't sugar-coat the message. There's a full page on major diseases, for instance. A chart shows how the apple varieties rank in terms of resistance to five common diseases, and a list of recommendations divides the country into eight regions and suggests disease-resistant apples for each. Sections on other fruits also contain information on disease resistance. The Ameses' expertise is available after purchase as well: customers are encouraged to write or call for additional advice.

The Ameses' approach is succeeding well beyond the Ozarks. "Their trees are of a consistently high quality," says Bruce Fraedrich, vice president of research at Bartlett Tree Research Laboratories, a division of the F.A. Bartlett Tree Expert Company. Bartlett's lab is in Charlotte, North Carolina—that's "Mid-South" in the Ameses' scheme of things ("fireblight, cedar rust, leaf spot, fruit rots"). The lab takes a low-spray approach to fruit and has been ordering trees from the Ameses for the past four years. "Summer rot is a big apple problem in the Southeast and their selections have been very resistant, particularly 'Blairmont' and 'Gala'," says Fraedrich. "For plums, the Auburn University cultivars have done well—'AU Roadside', for example. The Ameses' recommendations for Asian pears are also excellent."

"I found their recommendations very useful," says Donald Geiger, a biologist at the University of Dayton in Ohio. ("Midwest," say the Ameses: "fireblight, scab; mildew and cedar rust in some areas.") Geiger is planting an apple orchard as part of a university environmental center. Over the past two years, he has bought half a dozen varieties from the Ameses, including 'Liberty', 'Redfree', and, of course, 'Dayton'. "The plants were in excellent condition," he says, "and the proof is that they took off right away."

The Ameses have also supplied trees to Dripping Springs Organic Farm, a neighboring Arkansas operation with a four-acre orchard where apples and Asian pears from the Ameses came into bearing for the first time last year. "We were real impressed," says co-owner Michael Crane. "The pears especially were really sweet and juicy." The trees are doing well on a regimen that includes neither irrigation nor spraying. "We used to do all our own budding and grafting—growing our own rootstocks," says Crane. "But it's really great to have someone you can count on doing that for you."

Guy Ames is always looking for other fruits that will thrive on adversity. He keeps up with university research into disease resistance, and he looks out for worthy antiques as well. "People often get the idea that antique apples are necessarily disease resistant," he says, "but that's not so." Next year, he may add some native fruits, such as pawpaws and American persimmons, and he may even try a new dwarf apple rootstock from Cornell University. He has yet to find a dwarf that he likes, but popular demand makes a second look worthwhile.

Ames senses a renewed interest in growing food at home. But he finds it "disturbing" that so few people seem to know how to do it. "You really have to hold peoples' hands," he says. "A lot of people are starting from zero." No question, then, that both the Ameses' trees and their advice will continue to bear fruit. —*C.B.*

For a copy of the Ameses' free catalog, contact Ames' Orchard and Nursery, 18292 Wildlife Road, Fayetteville, AR 72701, (501) 443-0282.

CONSERVATIONIST'S NOTEBOOK

The Desert Ironwoods

A legend among the Seri tribe of Mexico, recounted by Richard Felger and Mary Beck Moser in *People of the Desert and Sea*, tells of a giant who chewed desert ironwood seeds and blew the pulp out over wind-whipped water, calming it so he could harpoon fish. Today the Seri and the desert ironwood (*Olneya tesota*) figure in a true story of U.S. and Mexican conservationists and government officials, who are collaborating to protect the economic well-being of the Seri and the delicately balanced ecology of the Sonoran desert.

The Seri, a small tribe living on the Gulf of California at the edge of the Sonoran desert, have been called the last hunter-gatherer society in North America. Up until the mid-20th century, they subsisted on marine life from the teeming coastal waters and wild game and plants from the desert. But in the 1960s modern commercial fishing fleets over-harvested the gulf and put an end to the Seri's millenia-old, self-sufficient way of life. The resourceful Seri turned to artistry for their livelihood, crafting stylized figurines to sell for premium prices in the tourist trade. The material of choice for their sculptures was the heavy, dense ironwood.

Increasing deforestation in the ironwood's range has raised concerns about the fate of the Seri and the diminishing biodiversity of the desert. Gary Paul Nabhan, a prominent desert ecologist and a research associate for the Washington-based environmental group Conservation International, heads the Ironwood Task Force. An alliance of researchers, universities, businesses, and public agencies, the task force was established in the fall of 1991 to study the impact of ironwood depletion and to suggest alternative solutions.

A slow-growing, long-lived leguminous tree, the desert ironwood is found in the mesquite groves, or *bosques*, of the Sonoran desert. "Ironwoods have been radio-carbon-14 dated to as old as 1,500 years—much older than most of the trees in the so-called ancient forests of the Northwest," says Nabhan. This longevity provides a stable, shaded haven from the intense light and heat of the desert, making the ironwood a home for some 160 species of plants and over 80 species of birds.

Courtesy of Matt Johnson

Olneya tesota *provides shade for Sonoran plants and birds.*

Like many other legumes, the trees enrich the soil by fixing nitrogen. But in addition, ironwoods help to prevent erosion and their shade is one the few places plants can germinate in the desert without risk of desiccation. The ironwood's shadow is a sanctuary for such signature desert plants as towering saguaros and night-blooming cereus. "Virtually no cacti germinate outside the canopies of desert legumes," Nabhan says. "Canopies are so dense that the temperature is sometimes 15 degrees cooler than the atmosphere five feet outside the shadow. The micro-environment beneath the ironwood is also kept four to six degrees warmer during freezes."

Last year conservationists estimated that nearly half a million acres of desert forest had been cleared for agriculture or other development. One of the biggest threats to ironwoods is ranchers who clear large tracts of land for pasturage and often leave the trees to rot. The landowners compound the damage by displacing native plants with exotic, invasive grasses such as buffelgrass, a South American import.

Recently, ironwoods have fallen victim to the culinary fad of mesquite grilling, especially popular in U.S. steakhouses. Ironwood is misleadingly mixed into the mesquite charcoal used to flavor grilled food, a bad deal for the buyer since ironwood increases the weight of the product without enhancing the flavor. Conservationists ask American gastronomes and restaurateurs to help out by demanding 100 percent mesquite charcoal.

In Mexico, concerned citizens, including 80 Seri, have signed a petition asking the government to protect the desert ironwood; last December, the government did just that, declaring the ironwood a "keystone" species of the Sonoran ecosystem and prohibiting its cutting. The Secretariat of Agricultural and Hydraulic Resources has hired extra field agents to enforce the new law. In the United States, the U.S. Fish and Wildlife Service is committed to stopping ironwood from crossing the border, and the state of Arizona has outlawed the transportation of ironwood.

But it may already be too late for the Seri. According to Lisa Famolare, a Washington spokeswoman for the Ironwood Task Force, "In some places the Seris now have to go miles to get ironwood." Activists on both sides of the border are encouraging the woodcarvers to explore new materials. These include brazilwood, mahogany, and the nut of the tagua palm. The most logical choice turns out not to be wood at all but a soft, heavy stone called barite. The mineral has the advantage of being found in large deposits near Seri villages, and comes in a wide range of colors, from brick red to aquamarine.

—Steve Davolt
Editorial Assistant

Leaves, Light, and Air

People have been cultivating plants for at least 9,000 years, so you might think that we'd have leaves pretty well figured out by now. But their basic function—photosynthesis—remains mysterious in its details. And since every living thing depends upon it, the intersection of light and leaf is a mystery of the highest order.

The purpose of photosynthesis is to store the sun's energy in a usable form. The process is of Persian carpet complexity but its net effect is to combine carbon dioxide (CO_2) and water to form sugar and free oxygen. The CO_2 is drawn from the air, the water is drawn from the ground, and the oxygen is released into the air. It's the sugar that the plant is primarily after. Sugar can be broken down to release energy or combined to form the huge carbohydrate molecules, starch and cellulose. (Starch is really a way of storing sugar; cellulose is the basic building block of plant cell walls.)

At the heart of this activity is a complicated molecule called chlorophyll. Chlorophyll is embedded in a long, narrow membrane inside a cell organelle called a chloroplast. Chloroplasts were once independent organisms rather like cyano-bacteria—the "blue-green algae" that form pond scum. They still have their own DNA, from which chlorophyll is synthesized.

Chlorophyll is a pigment, which means it absorbs only very specific wavelengths of light. It shares its membrane with another set of pigments called carotenoids. These pigments are arranged into little clusters, each around a central chlorophyll molecule called a reaction center pigment. The clusters are of two types. In one kind, called Photosystem I, the reaction center pigment absorbs light best at 700 nanometers—that's very deep red. The other kind, Photosystem II, absorbs best at 680 nanometers—still red but not quite as deep.

Imagine the first part of photosynthesis as a cycle beginning and ending at a Photosystem II cluster. The cluster acts like a tiny radar dish, capturing light of the right wavelength and transferring the energy from one pigment molecule to the next, until it reaches the reaction center pigment.

Margaret Scott

That pigment uses the energy to force one of its electrons onto a nonpigment "acceptor molecule." To replace its electron, the pigment then squeezes one out of another kind of molecule, called Z for short. Meanwhile, the pigment's ex-electron bounces into a kind of staircase reaction from one acceptor molecule to another, until it's absorbed by a Photosystem I reaction center pigment, which needs to replace an electron lost to its own acceptor molecule staircase. The electrons bouncing down this second staircase are used to load hydrogen ions onto yet another molecule, NADP. The resulting substance, NADPH, will eventually use those ions to link CO_2 into carbohydrates. The hydrogen ions close the loop: they come from the breakdown of water—a reaction the Z molecules are carrying out to replace the electrons they lost to Photosystem II. That reaction also produces the oxygen you're breathing.

Some of those hydrogen ions are used to synthesize another type of molecule called ATP. In both plants and animals, ATP is the cellular equivalent of gasoline: it can be "burned" to release a lot of energy, but it's too unstable to store over the long term. In the second part of photosynthesis, ATP and NADPH are used to "fix" CO_2 into sugar molecules. Most plants do this by combining an already extant five-carbon sugar with a CO_2 molecule to produce two three-carbon molecules. More complex sugars are synthesized from these. Since the first stable products of the reaction are three-carbon molecules, plants that use this process exclusively are called C3 plants.

In bright light and high temperatures, C3 plants seem to misfire. An enzyme that's supposed to fix the CO_2 onto the sugar starts fixing oxygen instead. A subsequent reaction ends up *releasing* CO_2. This process, called photo-respiration, is a puzzle. It doesn't hurt the plant but it appears to defeat the aim of photosynthesis, since it causes the plant to lose carbon.

Some plants have modified the C3 process to avoid photo-respiration. In these species, one type of cell combines CO_2 with a three-carbon substance to make a four-carbon molecule, which is then transferred to cells deeper in the leaf. There, the CO_2 is split off and fed into the regular C3 cycle, while the leftover three-carbon compound is returned to capture another CO_2 molecule. Less oxygen is available deep in the leaf, so photo-respiration is less likely, and there's time to fix any errant CO_2 before it escapes into the air. Plants that use this process are called C4 plants. In bright light, a C4 plant can pack away carbohydrate up to twice as fast as a C3 plant.

Most garden and crop plants rely on C3 photosynthesis. C4 plants are mostly tropical monocotyledons (plants with one seedleaf)—a category that includes corn, sorghum, and sugarcane. Zoysia and bermuda turf grasses are C4 plants, as are some common temperate-zone weeds, like crabgrass and Russian thistle.

Our collaboration with the process that gives us breath and food has entered a new phase. We are probably changing the level of atmospheric CO_2, and that will affect the relative efficiencies of the C3 and C4 pathways. Currently, the air is about 330 parts per million CO_2, but that level is likely to rise. The combustion of fossil fuels is releasing carbon fixed over 300 million years ago, by the vast swamp forests of the Carboniferous period. If the CO_2 level rises, C3 plants will grow in efficiency relative to C4 plants—a change that could have a major impact on plant communities the world over. By reversing that ancient photosynthesis, we may alter the ecological balances that photosynthesis maintains today.

—Chris Bright
Assistant Editor

Long Night's Journey Into Day

Your supermarket *Kalanchoe blossfeldiana* has long since shed the flowers you bought it for and degenerated into a heap of leaves. Yet your care is far superior to the produce manager's: you offer careful watering, fertilizer, comfortable temperatures, plenty of light, and better music. What did the grower know that you don't?

The answer might lie in the intricacies of photoperiodism, or daylength sensitivity. Some plants, like the kalanchoe, flower only on a certain lighting schedule. This mechanism allows plants to fine tune their flowering season with great precision, and it guarantees that plenty of potential mates will be flowering at the same time. In some species the mechanism is so precise that plants will react to daylength differences of only several minutes.

Daylength isn't hard to understand if you can keep the terminology out of the way. The word itself is misleading since it's really the length of nights—not days—that counts. We know this because of experiments in which plants were exposed to periods of light and darkness that didn't add up to 24 hours: once the dark period was the right length, some species would flower whether the light period lasted for an hour or a day. The term "daylength" came from an early misunderstanding about what the plants were measuring.

Plants sensitive to daylength are classed as either long-day or short-day species. But here too, the terms are misleading since a long-day plant does not necessarily require longer days to flower than a short-day plant. The distinction is based on the plants' requirements after a point called the "critical daylength" is reached. Long-day plants begin to flower only after the days grow *longer* than their critical daylength; short-day plants flower after the days grow *shorter*.

If that's not yet as clear as daylight, take a couple of examples. Black henbane (*Hyoscyamus niger*) has a critical daylength of roughly 11 hours. It will flower only when the days grow longer than that, so it's a long-day plant. The annual weed cocklebur (*Xanthium strumarium*), on the other hand, has a critical daylength of 15½ hours. It flowers when the days grow shorter than that, so it's a short-day plant, even though its critical daylength is four and a half hours longer than henbane's. This makes sense when you think of the plants in a seasonal context: the henbane flowers in early spring, when the short days of winter are lengthening, while the cocklebur flowers just after midsummer, as the longest days of the year begin to shorten.

Some plants are so sensitive that flowering requires only a single dark period after critical daylength is reached. The cocklebur and the Japanese morning glory (*Pharbitis nil*) operate this way. But other plants need several cycles of the right duration before they will flower. Soybeans, for example, usually require four. In some plants the trigger has a "safety" mechanism that requires a sequence of "short" and "long" days (relative, of course, to the plant's critical daylength). Some clovers, for instance, require short days followed by long days, so they're classed as a short-long-day plants. Conversely, some bryophytes (mosses and liverworts) are long-short-day plants.

Sometimes other independent processes must be satisfied before a plant's daylength sensitivity is unlocked. Many long-day plants, for instance, require a period of cold before they can respond to lengthening daylight. This phenomenon, called vernalization, makes obvious sense in a seasonal context as well: winter precedes the longer days of spring.

Picky Flowers

Long Day	Short Day
Baby's Breath	Aster
Beets	Begonia
Carnation	Chrysanthemum
Cornflower	Coleus
Gaillardia	Corn
Marguerite	Cosmos
Onions	Dahlia
Phlox	Euphorbia
Shasta Daisy	Poinsettia
Verbena	Zinnia

Since the amount of daylight varies not just with the season but with the latitude, daylength sensitivity can also have a geographical component. Sometimes you can find geographical variation in a single species, if it occurs over a wide enough area. On the Great Plains, for example, the critical daylength of a grass population in Manitoba may vary radically from that of the same species as it occurs in Texas. Since daylength doesn't vary much at tropical latitudes, it's not surprising that daylength sensitivity seems to be more common in plants native to the temperate zones.

The mechanics of daylength sensitivity are not fully understood. We know the process uses the pigment phytochrome, because the wavelengths that trigger it are precisely the ones that phytochrome absorbs. Phytochrome plays a role in many aspects of plant growth. We know from experiments with carefully timed bursts of light that phytochrome tells time by participating in a "circadian rhythm"—a biological clock that operates at the subcellular level in both plants and animals. We also know that the mechanism is located in the leaves, based on experiments in which leaves stimulated by the proper daylength induced flowering when grafted onto unstimulated plants of the same species.

But how do the leaves tell the buds to bloom? Over half a century ago, a Russian plant physiologist named Mikhail Chailakhian proposed that they did it by releasing a universal flower-inducing hormone he called "florigen." His hypothesis got some support from grafting experiments in which stimulated leaves of one species caused unstimulated plants of another species to bloom. Different species of daylength-sensitive plants must therefore be using the same or very similar signals. But despite decades of research, "florigen" has never been identified. Many scientists now suspect that the signal is not a single chemical but a combination of several, drawn from the immense library of substances that regulate plant metabolism.

Whatever the stimulus is, your kalanchoe will produce it about six weeks after the daylength drops below 10 hours. —*C. B.*

The Shadows Know

by George Taloumis

I have a little shadow that goes in and out with me, and what can be the use of him is more than I can see..." wrote Robert Louis Stevenson. What use is a shadow? A lot, indeed, if what you want is to create intrigue, drama, depth, and motion in your garden or even in an "interior plantscape."

Nature gives us shadows in all its elements, in the flicker of firelight, the surging and crashing of ocean waves, jagged peaks, and gently undulating plains. We can even see the wind in the shadows of swaying branches and fluttering and swirling leaves.

In her book *Spanish and Portugese Gardens,* Boston landscape architect Rose Standish Nichols described one scene: "Dark shadows lie under the trees, and sunlight only filters through the leafy branches." And another: "Palms and orange trees planted in regular rows cast pleasant shadows."

Writer Su Tung-p'o observed: "There are bamboos 10,000 meters high if you look at their shadows by moonlight."

Margaret Scott

My interest in plant shadows was sparked some years ago, when creative lighting was the major element in an exhibit at the New England Spring Flower Show sponsored by the Massachusetts Horticultural Society. The lights created a spellbinding chiaroscuro on the overall design, and all three of us who were judging gave the display the highest score possible.

All this suggests that while shadows may be of limited practical use, they are among those things that enhance our enjoyment of life as we become more aware of them. More importantly, it suggests that we should keep shadows and their movements in mind in our gardening. In situating plants, we should consider the longer shadows they will cast morning and evening. In summer, the shadow of a tree does have a very utilitarian purpose when we want shade. Trees planted on the south or southwest side of your house can even save on your air-conditioning bills. But in addition, we should consider the linear shadow that the trunk of a specimen tree, such as an oak or maple, will cast on a lawn or pavement, or the pools of light and shade made by the canopies of small flowering trees such as dogwoods and crabapples. A gentle breeze or a brisk wind will render the shadows of leaves or small branches even more mesmerizing.

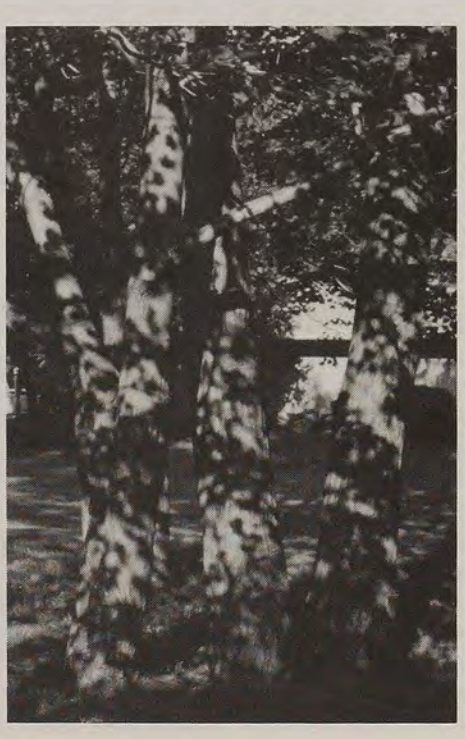
In winter, when shadows are lengthened by the lower angle of the sun, the spiderweb of a shadow cast against a house, garage, or fence by small tree branches

An expanse of lawn provides a big, bare canvas for long trunk shadows morning and evening (left) or pools of leaf shadow nearer midday (below). A stockade fence (bottom) also gives shadows a place to play.

PHOTOS BY GEORGE TALOUMIS

PHOTOS BY GEORGE TALOUMIS

Herbaceous plants can create their own interesting shadows, as can nonliving garden features. A spider plant (left), whose shadow is joined on this exterior wall by those of a nearby tree, is also a good candidate for an interior "shadowscape." An old-fashioned picket fence (above) creates a pattern both on the ground and on containerized chrysanthemums. Trees (bottom left and center) not only cast shadows, but catch them as well.



could be the most beautiful element in your garden. Think about the shadows cast on plants by each other or by other objects, such as picket fences or arbors. And don't overlook the shadows that a single container plant can cast against a wall indoors or out—a spider plant or ivy geranium in summer, or an arrangement of yew with strawflowers or balsam fir with red *Ruscus aculeatus* in winter.

Nineteenth-century poet Lucy Larcom described "light in shadows and shadow in light, and black in the blue of the sky." Robert Louis Stevenson may have had just a little shadow, but gardeners can also have big ones, lazy ones, exuberant ones, dark and gloomy ones, and delicate lacy ones. The plants around you are casting all kinds of shadows for you to enjoy. All you have to do is notice.

George Taloumis is a free-lance garden writer and photographer who lives in Peabody, Massachusetts.

The Right Wavelength

Of the total range of radiation that we receive from the sun, only the light visible to human eyes—in the range from 400 to 760 nanometers—drives plants' chemical building system. Plants are easily damaged by ultraviolet light (below 400 nanometers), which can sear the epidermal layer of leaf cells, and most do not tolerate excessive infrared light (above 760 nanometers), which can raise their temperatures to unhealthy levels.

Each plant pigment absorbs a different wave length of radiation, and uses it for a designated purpose. The most well-known pigment is of course chlorophyll, which absorbs blue and red light and drives photosynthesis. Also crucial and believed present to some degree in all plants is phytochrome, which reflects red and far-red light. It is responsible for germination, dormancy, formation of bulbs and tubers, root growth, and the color of fruits and flowers.

Margaret Scott

Carotenoids absorb yellow-orange light and reflect blue, and control the ripening of fruit and the falling of leaves. Riboflavin, which absorbs violet light, controls the way plants move in response to light, or phototropism.

In spite of these general rules, the same radiation level doesn't affect all plants the same way. As a rule, plants grow tall in red light and become bushy in blue light. But petunias attain their ideal short and bushy shape in either green or red light, and become lanky in blue. Tomato plants grow tall in green light, short in blue light, and like the Baby Bear in Goldilocks, find red light "just right."

Similarly, the germination of some seeds—triggered by red light—is inhibited by far-red light, while the sprouting of others is brought to a halt by blue light.

Observations that plants require primarily red and blue light and reflect yellow and green has led to the development of special lamps to mimic that assumption, notes H. Marc Cathey, president of the American Horticultural Society, who spent 40 years studying the effect of light on plants for the Agricultural Research Service of the U.S. Department of Agriculture.

EMERGENCY FLARES

Diagnosing plant problems is never a cut-and-dried science, because one problem—too much or too little water, for instance—can interplay with another, such as too much or too little fertilizer. Nevertheless, here are some distress signals sent out by plants that aren't getting the right amount of light:

General light deficit. Reduced leaf size, lengthening of the internode (the stem between leaves), changes in stem orientation, and loss of old leaves are signs that a plant needs more light.

There may be problems unique to specific plants. Swiss cheese plant (*Monstera deliciosa*) may lose its characteristic holes. On other plants, new leaves may not unfurl or stems that should be compact and upright may extend horizontally.

General light excess. In general, too much light stunts plants, but initial damage may be internal. Leaves may curl and appear pale, edged with red. Plants may sunburn, especially if they are dry; excessive heat and light break down chlorophyll and bleach leaf tissue. Some variegated plants, such as *Dieffenbachia*, may become discolored, with areas between leaf veins turning yellow, tan, or brown. Most plants can be saved by pruning damaged leaves, reducing light, and watering properly.

Too few hours of light. Most indoor plants need light for about 12 hours a day. If they are getting fewer than eight, a number of problems can occur. Even on a low-light plant like philodendrons, new leaves may become progressively smaller and thinner than older ones, although the color remains dark green. Internodes become progressively longer. Shoots develop without orientation to light or gravity. Older leaves start to drop, and finally, no new leaves appear.

Too many hours of light. Some plants are extremely sensitive to too many hours of artificial light. For instance, the leaves of *Brassaia actinophylla* rapidly lose their color. Leaves point straight up, instead of at right angles to the light source. Old leaves turn crisp and curl up. New leaves don't green up properly, but rapidly curl and die.

Indoor plants do best with no more than 16 hours of light. They need four, and preferably six, hours of darkness for proper chlorophyll function and other metabolic processes.

Sun scorch. Plants can suffer from sun scorch within a few hours, most often when they are shifted from dim interior conditions to a bright window or outdoors in spring. Plants accustomed to low-light conditions develop shade leaves, in which cells have rearranged themselves to capture more light, and sudden direct light heats the leaves to temperatures that kill the tissues. Acclimatization—moving plants into increased levels of light gradually—promotes the formation of sun leaves, with layers of densely packed cells oriented perpendicular to the light source.

This article was adapted from "Plant Distress Signals," by H. Marc Cathey and Lowell E. Campbell. For a copy of the entire paper send $2 to Distress, Gardeners' Information Service, in care of the AHS address.

But Cathey notes that most plants grown indoors developed in an environment in which light was filtered by layers of green leaves that were transmitting yellow and green light. "Thus we need the full range of visible radiation to simulate the environment in which plants have evolved."

To achieve this, his research shows that the most efficient options are:

The sun. It's clearly your cheapest source of energy, unless you need to knock out a wall and add skylights. It does vary in quality and quantity from season to season, and about 50 percent of its energy is in the infrared range, which can overheat plants.

Metal halide or high pressure sodium high intensity discharge lamps. These create light by passing electricity through vapor under high pressure. Halide lamps produce energy in both the blue-violet and red-orange ends of the spectrum. Sodium lamps will give you light energy only in the red-orange end of the spectrum, but it is possible to buy bulbs with a blue segment.

Both of these are powerful lamps to be used for lighting large areas, and need to be placed at least seven feet from plants. A 400-watt fixture eight feet from plants will light a 50-square foot area, Cathey says. Although operating a 400-watt lamp clearly requires a lot of electricity, Cathey's research found that these are particularly efficient lamps, converting 30 percent (halide) and 36 percent (sodium) of their electrical input into visible radiation, compared to only 15 percent for incandescent lights and 13 to 16 percent for fluorescent "grow lights."

Cool white and warm white fluorescent lights. These are next in efficiency, converting 21 percent of their input into visible radiation. You need warm fluorescent to provide radiation in red wave lengths and cool fluorescent for blue. These are best for growing seedlings, or low-profile plants like African violets, as they need to be within a foot or less of the top of plants.

Fluorescent grow lights provide light over the entire visible spectrum, but lose points with Cathey because of their inefficient conversion ratio. —*Kathleen Fisher*
Editor

Courtesy of A.E. Bye

If you have undulations in your landscape, here's a way to take advantage of them. A. E. Bye, a landscape architect based in Ridgefield, Connecticut, uses heavy-duty earth-moving equipment to create these shadow-enhancing topographical ripples for clients' large estates. But you might create a miniature version on your own quarter acre with a row of small, bare-trunked trees. "Our clients are always excited to see what happens" as the shadow patterns change from morning to evening and season to season, Bye observes. Above, the Bye estate in Holicong, Pennsylvania. Below, an estate in Southampton, New York.

AHS BULLETIN BOARD

MONTESSORI CO-SPONSORING CHILDREN'S SYMPOSIUM

The American Horticultural Society and the American Montessori Foundation are co-sponsoring a national symposium, "Out of the Classroom and Into the Garden" in Arlington, Virginia, August 5 through 7. The event will feature three days of keynote addresses by prominent educators and horticulturists, workshops, exhibits, hands-on gardening clinics, garden tours, and social events such as an old-fashioned Chesapeake Bay crab feast and a square dance.

This national meeting is designed to train school and community educators to use gardens to bring hands-on learning about natural science into the curriculum.

Last August, AHS sponsored a national symposium for educators of children in grades kindergarten through eight. This year's symposium will include workshops on gardening with high school youth and on starting community gardening projects for teenagers and college students.

Joyce St. Giermaine, executive director of the Montessori foundation, attended the 1993 symposium and was so inspired she persuaded other Montessori officials to answer the meeting's "call to arms": to restore young people's everyday relationship with nature. The foundation has committed itself to long-term promotion of gardens and gardening programs at all 5,500 Montessori schools nationwide. To begin this effort, they invited AHS to help them produce another national symposium on children's gardening.

Keynote speakers will be Joyce Chawla, an environmental psychologist who teaches at Whitney Young College in Kentucky; Bill Lucas, founder and director of England's Learning Through Landscapes Trust Program; Ward Cheney, founder and director of the Drumlin Food Project in Lincoln, Massachusetts; and Sharon Lovejoy, author of three gardening books for children.

Chawla began her teaching in Montessori schools in suburban Pennsylvania. She earned a master's degree in education and child development at Bryn Mawr College and a doctorate in environmental psychology at the City University of New York. Her book *In the First Country of Places* examines how five poets from diverse backgrounds have used childhood memories of the natural world. She has written widely on the interrelationship of children and environment. She serves as associate editor of the journal *Children's Environments*, and is past president of the Kentucky Association for Environmental Education.

Chawla will deliver the symposium's opening keynote address, an overview of psychological research on how children develop affection for nature and a sense of earth stewardship, suggesting how teachers and parents can give children meaningful experiences with nature through gardening.

Bill Lucas started his career as a teacher in 1979 and was headmaster of a large secondary school in West London. He is the author of many books on education and the environment, most recently, *Bright Ideas in the Outdoor Classroom.*

Lucas conceived Learning Through Landscapes as a way to beautify and educate by using school grounds throughout England, especially urban schools without access to natural areas. Founded in 1985, it has transformed thousands of school grounds into attractive areas teeming with wildlife and educational opportunities.

Lucas's keynote speech will describe the importance of school grounds as an influential early environment that too often is barren and neglected, with nothing to stimulate the imagination or senses. He will

HERB WORK-STUDY PROJECT

June 1 through 4, the American Horticultural Society's River Farm headquarters will be the site of a work-study program on gardening and designing with herbs.

Participants will be trained in herb gardening techniques by a professional horticulturist and garden designer. Then working alongside professional staff, they will assist in the renovation and planting of a new herb garden, designed to be a nationally significant ornamental and educational showpiece. The new herb garden has been designed by Holly Shimizu, assistant director of the U.S. Botanic Garden and known nationally as an expert on herbs and herb garden design.

The team will work for four hours each morning preparing the soil, installing irrigation, planting the garden, labeling plants, mulching, and documenting the planting process.

In the afternoons, participants will tour Washington, D.C.-area herb gardens and attend a lecture on herb garden design and an herbal craft workshop. Garden tour sites include the Mount Vernon estate, the U.S. National Arboretum, the Washington Cathedral, and DeBaggio Herb Farm, a retail herb center.

Enrollment in this five-day work-study program is $550, which will cover bed and breakfast in Old Town Alexandria, Virginia; box lunches each day; opening and farewell dinners at River Farm, and transportation from Old Town to River Farm and to garden tour sites.

To request an application form or for more information, contact Maureen Heffernan at (800) 777-7931 or write the AHS Education Department.

suggest how educators can develop a variety of imaginative landscapes, use school grounds to teach the entire curriculum, and involve children in altering landscapes.

Ward Cheney received a bachelor's degree in visual arts from Dartmouth College and has considerable experience in land management and youth issues. He was director for five years of the Greenpower Farm in Weston, Massachusetts, where he supervised youth in growing vegetables and serving them at soup kitchens and homeless shelters in the Boston area.

Cheney now directs the Drumlin Farm Food Project, which is supported by the Massachusetts Audubon Society. In its first two years the project has provided full-time summer jobs to 66 teenagers from the Boston area. Teens work on the farm four days a week for eight weeks, planting, maintaining, and harvesting produce in a 15-acre organic garden. They then volunteer one day a week in urban soup kitchens preparing and serving what they've grown. In addition to these paid summer workers, more than 700 teenagers have volunteered to help grow and serve produce.

Drumlin also runs programs for teachers and college students. Teachers work on the farm and learn how to include farm and gardening experiences in high school curricula. College students are introduced to hands-on farming and issues relating to hunger and the environment.

Cheney will explain how the project operates and how teachers, parents, and community youth can initiate their own school or community programs.

Sharon Lovejoy has lectured at botanical gardens, arboreta, museums, and other educational institutions throughout the United States for the past decade. She has been a naturalist for the Smithsonian Institution and the Morro Bay Museum of Natural History.

Author and illustrator of *Sunflower Houses, Garden Discovery for Children of All Ages,* and *Hollyhock Days,* she is also a contributing editor for *Country Life Gardener* magazine and has written for the National Wildlife Federation and Rodale Press. She is owner of Heart's Ease, a herb and garden shop in Cambria, California, where she combines her training in art at San Diego University with her love of plants and gardens.

Lovejoy will present garden designs, crafts, and story ideas to be shared with children, and will be available to sign copies of her children's gardening books.

The symposium will be held at the Doubletree Hotel in Arlington. To receive full registration information, please call AHS at (800) 777-7931.

Roger Gordy

Participants in the Drumlin Farm Food Project. Founder Ward Cheney will speak at the AHS-Montessori symposium in August.

INDIANA CHILDREN'S SYMPOSIUM

The American Horticultural Society and the Orchard Country Day School of Indianapolis, Indiana, will co-sponsor a regional symposium, "Educational Opportunities: Children, Plants, and Gardens" April 29 in Indianapolis.

The symposium is designed to reach a broad audience—teachers, horticulturists, parents, civic leaders, and Master Gardeners—in the Midwest. Its goal is to act as a catalyst for exchanging ideas and information on introducing more children to plants and gardening. In addition to lectures on a wide variety of gardening topics, there will be an emphasis on hands-on gardening projects that can be used in a range of educational settings.

This regional symposium was proposed by Orchard Country Day School teachers who attended AHS's national children's gardening symposium in Washington last August.

Plans for the symposium include a keynote address by George C. Ball Jr., immediate past-President of AHS and president and chief executive officer of the W. Atlee Burpee Co.; Sharon Lovejoy, lecturer and author of three children's gardening books; and Maureen Heffernan, AHS education coordinator, who will describe the children's garden project at River Farm. There will also be hands-on workshops led by regional presenters and a poster session.

The symposium will be part of a three-day "Orchard in Bloom Gardening Show," an annual event in Indianapolis. The show features landscaped gardens, sale of plants, tools, garden furniture, and elegant garden gifts; special events; free gardening lectures; activities for children and much more. Admission to the gardening show is free for symposium participants and is being discounted $2 for all AHS members who present their membership cards.

For symposium registration information, contact Teri Jump, Educational Symposium, c/o Orchard in Bloom, 615 West 63rd Street, Indianapolis, IN 46260, (317) 848-5904.

SPRING IRIS SEMINAR

The American Horticultural Society and the Chesapeake and Potomac Iris Society are co-sponsoring a half-day educational seminar on iris at AHS's River Farm headquarters from 12:30 to 4 p.m. on April 10.

The seminar is open to anyone who would like to learn more about growing, propagating, and hybridizing iris species. Speakers will include Charles Nearpass, retired researcher on plant-soil relationships at the University of Maryland and the U.S. Department of Agriculture; Richard Sparling, an expert on miniature bearded irises and a master iris judge; Donald Spoon, professor of biology at Georgetown University; and Lloyd Zurbrigg, a hybridizer of tall-bearded and reblooming irises. Participants will be given educational hand-outs and a tour of the gardens at River Farm. A donation of $3 per person is requested. To register for the seminar, call AHS at (800) 777-7931.

RECIPROCAL ADMISSIONS

The American Horticultural Society membership card: don't visit botanical gardens without it! Gardens in 35 states, the District of Columbia, and the U.S. Virgin Islands admit AHS members free, and many offer free parking and giftshop discounts as well.

Look for the 1994 Reciprocal Gardens sticker at local gardens and when you travel. The following is a partial list of participants:

✦ **Alabama**
Birmingham Botanical Gardens
Huntsville-Madison County Botanical Garden

✦ **Arizona**
Tucson Botanical Gardens

✦ **Arkansas**
Eureka Springs Gardens
The Living Farm Museum of the Ozarks, Pocahontas

✦ **California**
The Conservatory, Golden Gate Park, San Francisco
Descanso Gardens, La Canada Flintridge
The Living Desert, Palm Desert
Mendocino Coast Botanical Garden, Fort Bragg
Quail Botanical Gardens, Encinitas
Santa Barbara Botanic Garden
Strybing Arboretum and Botanical Gardens, San Francisco
University of California Botanical Garden, Berkeley
Virginia Robinson Gardens, Beverly Hills

✦ **Colorado**
Denver Botanic Gardens
Four Mile Historic Park, Denver

✦ **District of Columbia**
Hillwood Museum

✦ **Florida**
Fairchild Tropical Garden, Miami
Flamingo Gardens, Fort Lauderdale
Harry P. Leu Gardens, Orlando
World of Orchids, Kissimmee

✦ **Georgia**
Atlanta Botanical Garden
Lockerly Arboretum, Milledgeville
The State Botanical Garden of Georgia, Athens

✦ **Hawaii**
Lyon Arboretum, University of Hawaii at Manoa, Honolulu

✦ **Idaho**
Idaho Botanical Garden, Boise

✦ **Illinois**
Cantigny Grounds, Wheaton
Garfield Farm Museum, LaFox
George L. Luthy Memorial Botanical Garden, Peoria
Robert Allerton Park, Monticello
Washington Park Botanical Garden, Springfield

✦ **Iowa**
Des Moines Botanical Center
Dubuque Arboretum and Botanical Gardens

✦ **Kentucky**
Bernheim Arboretum and Research Forest, Clermont

✦ **Louisiana**
Longue Vue House and Gardens, New Orleans

✦ **Maryland**
The Perkins Garden, Bethesda

✦ **Massachusetts**
Arnold Arboretum, Harvard University, Jamaica Plain
Berkshire Botanical Garden, Stockbridge
Massachusetts Horticultural Society, Boston

✦ **Michigan**
Fernwood Botanic Garden, Niles
Matthaei Botanical Gardens, Ann Arbor
W. J. Beal Botanical Garden, East Lansing

✦ **Minnesota**
Minnesota Landscape Arboretum, Chanhassen

✦ **Mississippi**
The Crosby Arboretum, Picayune

✦ **Missouri**
Missouri Botanical Garden, St. Louis
Powell Gardens, Kansas City

✦ **Nevada**
Wilbur D. May Arboretum & Botanical Garden, Reno

✦ **New Jersey**
Presby Memorial Iris Garden, Upper Montclair
Reeves-Reed Arboretum, Summit

✦ **New York**
Brooklyn Botanic Garden
Highland Botanical Park, Rochester
The Horticultural Society of New York, New York City
Institute of Ecosystem Studies, Millbrook
New York Botanical Garden, Bronx
Ross Park Zoo, Binghamton
Wave Hill, Bronx

✦ **North Carolina**
Daniel Stowe Botanical Garden, Belmont
Duke Homestead State Historic Site, Durham
Sandhills Horticultural Gardens, Pinehurst
The Sarah P. Duke Gardens, Durham

✦ **Ohio**
Franklin Park Conservatory, Columbus
The Holden Arboretum, Mentor
Kingwood Center, Mansfield

✦ **Pennsylvania**
Colonial Pennsylvania Plantation, Media
Hershey Garden
The National Aviary, Pittsburgh
Morris Arboretum of the University of Pennsylvania, Philadelphia
The Pennsylvania Horticultural Society, Philadelphia
Phipps Conservatory, Pittsburgh
The Scott Arboretum of Swarthmore College, Swarthmore
Taylor Memorial Arboretum, Wallingford
The Tyler Arboretum, Media

✦ **Rhode Island**
Blithewold Mansion and Gardens, Bristol

✦ **Tennessee**
Dixon Gallery and Gardens, Memphis
Memphis Botanical Garden Foundation

✦ **Texas**
Corpus Christi Botanical Gardens
The Dallas Arboretum and Botanical Garden
Dallas Civic Garden Center
Mercer Arboretum and Botanic Gardens, Humble
Moody Gardens, Galveston
National Wildflower Research Center, Austin
San Antonio Botanical Gardens

✦ **U.S. Virgin Islands**
St. George Village Botanical Garden, St. Croix

✦ **Utah**
Red Butte Garden and Arboretum, Salt Lake City

✦ **Vermont**
Park-McCullough House Museum, North Bennington
Vermont Wildflower Farm, Charlotte

✦ **Virgnia**
Lewis Ginter Botanical Garden, Richmond
Norfolk Botanical Garden
Orland E. White Arboretum, Boyce
Woodlawn Plantation/Pope-Leighey House, Alexandria

✦ **Washington**
Washington Park Arboretum, University of Washington, Seattle

✦ **Wisconsin**
Rotary Gardens, Janesville

✦ **Wyoming**
Cheyenne Botanic Gardens

GET IN FREE IN CINCY

Members of the American Horticultural Society will be admitted free to the Cincinnati Flower Show, which will be held in the city's Ault Park April 22-25. The is the only flower show in the United States to be endorsed by the Royal Horticultural Society of Great Britain. More than 50,000 visitors are expected at the five-day show, which will feature floral and garden displays, topiaries, a Gardeners' Market, ideas for weddings and table settings, exhibits of container gardening, and much more.

Get down to basics.

Linda Askey edits the garden pages of Southern Accents and Southern Living magazines and gives us four presentations on different styles of garden making.

Steve Frowine travels the world looking for new plants as vice president of horticulture at White Flower Farm and tells us about the best new garden varieties.

Brent Heath owns Gloucester Virginia's Daffodil Mart and relies on his expertise as a third-generation daffodil breeder to introduce us to dozens of daffodils.

Julie Messervy wrote "The Contemplative Garden" and helps us understand how gardens serve the human need for quiet, solitude and introspection.

Colonial Williamsburg and
the American Horticultural Society present

"Making Gardens"

Join more than 200 horticultural professionals and home gardening enthusiasts for the 48th

Williamsburg Garden Symposium April 10-13, 1994

For full registration information, please mail the coupon to Garden Symposium, P.O. Box 1776, Williamsburg, VA 23187-1776, or call (804) 220-7255.

Garden Symposium includes six days of access to Colonial Williamsburg's exhibition buildings, craft shops, museums, and gardens; two receptions and a closing dinner; and a full schedule of tours, talks, demonstrations, clinics, conversations and optional master classes.

Please send information on the Garden Symposium.

Name _____

Address _____

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PLANT SPECIALTIES

Alliums: The Ornamental Onions
Dilys Davies
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Book code: TIM 001
Color photographs and line drawings. *1992. 168 pages.*

Bamboos
Christine Recht and Max F. Wetterwald
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Color and black-and-white photographs, line drawings. 1992. 160 pages.

Conifers Second Edition
D. M. Van Gelderen and J. R. P. Van Hoey Smith
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Book code: TIM 003
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The Encyclopedia of Cacti
Willy Cullmann, Erich Götz, and Gerhard Gröner
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Book code: TIM 003
Color photographs. *1986. 340 pages.*

The Gardener's Guide to Growing Hellebores
Graham Rice and Elizabeth Strangman
Hardcover. Retail price: $29.95. AHS price: $26.50.
Book code: TIM 004
Color photographs and line drawings. *1993. 160 pages.*

Gentians
Fritz Köhlein, Edited by Jim Jermyn
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Book code: TIM 005
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Color and black-and-white photographs. *1992. 420 pages.*

Hardy Geraniums
Peter F. Yeo
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Book code: TIM 007
Color photographs and black-and-white illustrations. *1985. Reprinted 1992. 208 pages.*

Iris of China
James W. Waddick and Zhao Yu-Tang
Hardcover. Retail price: $27.95. AHS price: $25.
Book code: TIM 008
Color photographs and line drawings. *1992. 140 pages.*

Lilacs: The Genus *Syringa*
John L. Fiala
Hardcover. Retail price: $59.95. AHS price: $53.50.
Book code: TIM 009
Color and black-and-white photographs and line drawings. 1988. 37 pages.

Maples of the World
D. M. Van Gelderen, P. C. De Jong, and H. J. Oterdoom
Hardcover. Retail price: $59.95. AHS price: $53.95
Book code: TIM 080
Color photographs. *1994. 448 pages.*

Narcissus
Michael Jefferson-Brown
Hardcover. Retail price: $34.95. AHS price: $31.50.
Book code: TIM 011
Color photographs and line drawings. *1991. 256 pages.*

Ornamental Shrubs, Climbers, and Bamboos
Graham Stuart Thomas
Hardcover. Retail price: $49.95. AHS price: $41.95.
Book code: TIM 012
Color and black-and-white photographs. *1992. 544 pages.*

Plants for Ground-Cover Revised Edition
Graham Stuart Thomas
Hardcover. Retail price: $26.95. AHS price: $24.25.
Book code: TIM 013
1990. 380 pages. Color and black-and-white photographs.

Poppies: The Poppy Family in the Wild and in Cultivation
Christopher Grey-Wilson
Hardcover. Retail price: $32.95. AHS price: $29.75.
Book code: TIM 014
1993. 256 pages. Color photographs and line drawings.

Primula
John Richards
Hardcover. Retail price: $49.95. AHS price: $45.
Book code: TIM 015
1993. 352 pages. Color photographs and paintings; black-and-white photographs and line drawings.

Proteas of the World
Lewis Matthews
Hardcover. Retail price: $45. AHS price: $40.50.
Book code: TIM 016
1993. 256 pages. Color illustrations.

Purpleleaf Plums
Arthur Lee Jacobson
Hardcover. Retail price: $27.95. AHS price: $25.25.
Book code: TIM 017
1992. 206 pages. Color photographs.

Rhododendron Hybrids Second Edition
Homer E. Salley and Harold E. Greer
Hardcover. Retail price: $59.95. AHS price: $53.50.
Book code: TIM 018
1992. 480 pages. Color photographs.

Rhododendron Portraits
D. M. Van Gelderen and J. R. P. Van Hoey Smith
Hardcover. Retail price: $75. AHS price: $67.50.
Book code: TIM 019
1992. 424 pages. Color photographs.

Willows: The Genus *Salix*
Christopher Newsholme
Hardcover. Retail price: $34.95. AHS price: $31.50.
Book code: TIM 020
1992. 224 pages. Color photographs and line drawings.

The Woody Iridaceae: *Nivenia, Klattia,* and *Witsenia*
Peter Goldblatt
Hardcover. Retail price: $29.95. AHS price: $26.50.
Book code: TIM 021
1993. 128 pages. Color photographs and line drawings.

GARDENING BOOKS

GARDENING BOOKS

REFERENCE

Hortica
Alfred Byrd Graf
Hardcover. Retail price: $250. AHS price: $210.
Book code: ROE 400

Hortica is an extensive guide to plant identification. Alfred Byrd Graf has gathered a comprehensive selection of illustrations featuring choice ornamentals, as well as useful plants and edible fruit. Plants are photographed in gardens, botanical collections, and arboreta, or in natural habitats around the world. An appendix gives family, origin, synonyms (if any), common names, and usefulness. Zone and climatic tolerance are also indicated. *1,218 pages.*

Wyman's Gardening Encyclopedia
Donald Wyman
Hardcover. Retail price: $55. AHS price: $46.75.
Book code: MAC 666

Updated and expanded, the classic and indispensable *Wyman's Gardening Encyclopedia* contains a wealth of information on planning, planting, and maintaining any kind of garden. Its more than 1,200 pages, 10,000 entries, 206 drawings, and more than 100 photographs make it one of the most comprehensive one-volume gardening sourcebooks on the market today. *1,221 pages.*

North American Horticulture: A Reference Guide, Second Edition
Thomas M. Barrett, Editor
Hardcover. Retail price: $75. AHS price: $65.
Book code: MAC 123

Compiled by the American Horticultural Society, the completely revised and expanded *North American Horticulture* is the most comprehensive directory of U.S. and Canadian horticulture. Thousands of organizations and programs are described. Included are 28 categories, among them: conservation organizations, international registration authorities, national governmental programs, horticulture education programs, botanical gardens, arboreta, conservatories, and other public gardens, plant societies, and community gardens. *427 pages.*

The American Horticultural Society Encyclopedia of Garden Plants
Christopher Brickell, Editor
Hardcover. Retail price $49.95. AHS price: $42.50.
Book code: GAR 006

A comprehensive, up-to-date, and lavish guide to garden plants, this extensive encyclopedia includes over 8,000 plants, 4,000 of which are featured in full-color photographs. Written by a team of plant experts, *The American Horticultural Society Encyclopedia of Garden Plants* is designed to be the gardener's bible, a standard work of reference for every gardening bookshelf. *608 pages.*

The American Horticultural Society Encyclopedia of Gardening
Edited by Christopher Brickell and Elvin McDonald
Hardcover. Retail price: $59.95. AHS price: $49.95.
Book code: GAR 016

With 3,500 illustrations, including 400 series of step-by-step photos, this is the only gardening guide you'll ever need. The book is packed with basic and advanced gardening techniques and includes practical and informative tips on creating and maintaining your garden. Important plant groups—like hostas, daylilies, and irises—and cultivating techniques are highlighted. 1993. 648 pages.

Manual of Woody Landscape Plants
Michael A. Dirr
Hardcover. Retail Price: $45.80. AHS price: $38.95.
Book code: STI 001

The fourth edition has been revised and updated with 200 new species and over 500 new cultivars, each described and evaluated and usually accompanied by a line drawing and identifying characteristics. You'll find information on common and botanical names, hardiness zones, habit, growth rate, texture, bark color, leaf color, flowers, fruit, culture, disease and insects, landscape value, cultivars, propagation, related species, and native habitat. *Manual of Woody Landscape Plants* is one of the most widely used reference works in classrooms and in the field. *1,007 pages.*

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REGIONAL HAPPENINGS

Mid-Atlantic

✦ **Mar. 9-14. The Washington Flower and Garden Show.** The Washington Convention Center, Washington, D.C. Information: TJS Productions, (703) 569-7141.

✦ **Mar. 17. Sixth Annual Tidewater Horticultural Symposium.** "The Garden Border." Lake Wright Resort, Norfolk, Virginia. Information: (804) 425-1140 or (804) 423-2788.

✦ **Apr. 2. Oatlands Plantation Season Opening.** Leesburg, Virginia. Information: (703) 777-3174.

✦ **Apr. 10-13. Williamsburg Garden Symposium.** "Making Gardens." Sponsored by the American Horticultural Society and Colonial Williamsburg. Williamsburg, Virginia. Information: (804) 220-7255.

✦ **Apr. 16. Rare Plant Silent and Live Auction.** U.S. National Arboretum, Washington, D.C. Information: (202) 475-4815.

✦ **Apr. 24-25. Historic Garden Week.** Tour. Upperville, Virginia. Information: (703) 592-3209.

✦ **Apr. 30-May 1, 7-8, 14-15. Maryland House and Garden Pigrimage.** Throughout the state. Information: (410) 821-6933.

✦ **May 14. The 66th Annual Georgetown Garden Tour.** For the benefit of Georgetown's Children's House. Information: (202) 333-4953.

✦ **May 21-22. The 46th Annual Rose Show.** Coliseum Mall, Hampton, Virginia. Information: Virginia Kostyal, (703) 596-6452.

North Central

✦ **Mar. 18-Apr. 17. Spring Floral Show.** Krohn Conservatory, Cincinnati, Ohio. Information: (513) 421-5707.

✦ **Mar. 24-27. Ann Arbor Flower and Garden Show.** "Once Upon a Time." Matthaei Botanical Gardens, Ann Arbor, Michigan. Information: (313) 998-7061.

✦ **Apr. 23. Spring Affair.** "Preserve and Partake." Flower show. State Fair Park, Lincoln, Nebraska. Information: Anne Johnson, (402) 472-9981.

✦ **Apr. 28-May 1. Cincinnati Flower Show.** Ault Park, Cincinnati, Ohio. Information: (513) 579-0259.

Northeast

✦ **Mar. 6-13. Philadelphia Flower Show.** "Islands in the Sun." Philadelphia Civic Center, Philadelphia, Pennsylvania. Information: (215) 625-8250.

✦ **Mar. 11. Influences on American Garden Design: 1895-1940.** Symposium sponsored by the Garden Conservancy. New York City. Information: (914) 265-2029.

✦ **Mar. 11-13. Seventh Annual Capital District Garden and Flower Show.** "Enchanted Gardens." Knickerbocker Arena, Albany, New York. Information: (518) 356-6410.

✦ **Mar. 25. Longwood Graduate Program Symposium.** "Just Add Water—the Essential Garden Element." University of Delaware, Newark, Delaware. Information: (302) 831-3651.

✦ **Mar. 26-Apr. 10. Easter Conservatory Display.** Longwood Gardens, Kennett Square, Pennsylvania. Information: (610) 388-6741.

✦ **Apr. 5. Allium Notes: Discovering the Ornamental Onions.** Lecture. Tower Hill Botanic Garden, Boylston, Massachusetts. Information: (508) 869-6111.

✦ **May 1. Mad Hatter Garden Party.** Hagley Museum and Library, Wilmington, Delaware. Information: (302) 658-2400.

Northwest

✦ **Mar. 24-25. National Daffodil Show.** Portland, Oregon. Information: (503) 491-3874.

✦ **Apr. 3-9. Arbor Week.** Hoyt Arboretum, Portland, Oregon. Information: (503) 228-8733.

✦ **Apr. 9. Eighth Annual Spring Plant Sale.** Federal Way, Washington. Information: Charmaine Adsero, (206) 838-4646.

South Central

✦ **Mar. 10-13. The 27th Lawn, Flower, and Garden Show.** Wichita, Kansas. Information: (316) 721-8740.

✦ **Apr. 9-10. The 15th Annual Spring Garden Show.** New Orleans Botanical Garden in City Park, New Orleans, Louisiana. Information: (504) 486-3736.

Southeast

✦ **Mar. 11-12. Spring African Violet Show and Sale.** "Violets Welcome Spring." Mary Esther, Florida. Information: Dawn Perry, (904) 682-9705.

✦ **Mar. 18-19. Spring Plant Sale.** Mobile Botanical Gardens, Mobile, Alabama. Information: (205) 342-0555.

✦ **Mar. 18-20. Annual Orchid Show of the Deep South Orchid Society.** "Orchids Go Bragh." Savannah, Georgia. Information: Sandra Leopold (912) 355-7203 or Ron Melander (912) 236-3177.

✦ **Mar. 18-Apr. 16. Festival of Houses and Gardens.** Charleston, South Carolina. Information: (803) 722-3405.

✦ **Mar. 22-23. Tenth Annual Davidson Horticultural Symposium.** "Public Garden: Private Gain." Davidson, North Carolina. Information: (704) 892-8285.

✦ **Mar. 24. Southeastern Wildflowers—To Know and Grow.** Workshop. Callaway Gardens, Pine Mountain, Georgia. Information: (706) 663-5153.

✦ **Mar. 26. Perennials Conference.** Cheekwood Botanical Gardens, Nashville, Tennessee. Information: Jacqueline Broughton, (615) 353-2146.

✦ **Mar. 26. Planting History: How to Create the Look of the Historic Garden.** Symposium. Brookgreen Gardens, Murrells Inlet, South Carolina. Information: (803) 237-4218.

✦ **Apr. 23-24. Flowers and Art 1994.** "Landscapes of the Mind." The Dixon Gallery and Gardens, Memphis, Tennessee. Information: Suzy Carpenter, (901) 761-5250.

✦ **May 1-4. Menninger Sunbelt Tree Conference.** Lake Buena Vista, Florida. Information: (407) 351-2610.

✦ **May 4-8. American Rhododendron Society Annual National Convention.** Asheville, North Carolina. Information: James Wood, (704) 894-3075.

Southwest

✦ **Apr. 2-10. Spring Sale of Drought-Tolerant Plants.** Boyce Thompson Southwestern Arboretum, Superior, Arizona. Information: (602) 689-2723.

West Coast

✦ **Mar. 18-20. Orchid Show and Plant Sale.** Balboa Park, San Diego, California. Information: (619) 232-5762.

✦ **Mar. 19-Apr. 17. Spring Festival of Flowers.** Descanso Gardens, La Canada Flintridge, California. Information: (818) 952-4401.

✦ **Mar. 24-28. The Healing Dimensions of People-Plant Relationships.** The People-Plant Council's third national conference. University of California, Davis, California. Information: Patricia Lindsey, (916) 752-4385 or Mark Francis, (916) 752-6031.

✦ **Mar. 26-27. Bonsai Show.** The Huntington, San Marino, California. Information: (818) 405-2141.

✦ **Apr. 4-7. Fifth Global Warming Conference.** San Francisco, California. Information: Fax (708) 910-1561.

✦ **Apr. 9-10. Cacti and Succulent Show and Sale.** Sponsored by the South Coast Cactus and Succulent Society. South Coast Botanic Garden, Palos Verdes Peninsula, California. Information: (310) 544-6815.

✦ **Apr. 20-24. San Francisco Landscape Garden Show.** "A Fair to Remember." Herbst and Festival Pavilions, Fort Mason Center, San Francisco, California. Information: (415) 750-5105.

✦ **Apr. 20, 27. Planting Design: Color, Form, and Function.** Class. Santa Barbara Botanic Garden, Santa Barbara, California. Information: (805) 682-4726.

✦ **Apr. 23-24. Green Scene.** Plant sale. Fullerton Arboretum, California State University, Fullerton, California. Information: (714) 773-3579.

✦ **Apr. 23-24. Rose Show.** Sponsored by Pacific Rose Society. Los Angeles State and County Arboretum, Arcadia, California. Information: (818) 821-3222.

✦ **Apr. 24-25. Fourth Annual Rose Garden Fete.** Presented by the Temecula Valley Rose Society. Temecula, California. Information: (909) 699-4530.

✦ **Apr. 25-30. Visions of San Francisco.** Flower and horticulture show. Gump's, San Francisco, California. Information: Kay Wild, (415) 984-9384.

✦ **May 1. Secret Gardens of the East Bay.** Tour. Oakland, California. Information: (510) 653-0317.

LESSONS FROM HURRICANE ANDREW

Hard hit by Hurricane Andrew in the summer of 1992, the Fairchild Tropical Garden in Miami is forging order out of chaos with "Andrew's Garden." Opened to the public last October, the one-acre area has been left untouched so that visitors can observe the effects of the storm damage as well as the post-hurricane vegetative succession.

In Andrew's Garden, blankets of vines such as jasmine swaddle the fallen trunks of live oaks; fragments of chalky, oolitic limestone dangle from their exposed roots. Violently bent by Andrew's 145-mph winds, specimens of *Gaussia maya*, a resilient Central American palm, continue to grow. With the canopy stripped away, pioneer tree species such as cecropia, Florida trema, scholar's tree, and papaya spring up from the now sunlit understory.

Ann Parsons, chair of education for Fairchild and coordinator for Andrew's Garden, says the "uncreated" garden has several objectives, the foremost to give people a chance to see natural recovery in process. "Even though this was a devastated area and nothing was done to restore it, there is new growth here. Nature has a way of taking care of itself." The rampantly overgrown tract also offers a contrast to the continuing restoration at Fairchild, which re-opened its gates only 41 days after the hurricane. For visitors who did not experience Andrew firsthand, the demonstration area can also convey a small, uneasy sense of the hurricane's destructive impact.

A RARE-PLANT POSSE IN NEW ENGLAND

In Massachusetts, a crack team of amateur botanists has been conducting field research to identify and protect endangered native plants. In a cooperative effort by the New England Wild Flower Society (NEWFS) and the Massachusetts Natural Heritage and Endangered Species Program (MNHESP), volunteers surveyed rare plant populations, some of which had not been checked for 10 years.

The 22 volunteers in the pilot program were hand-picked from a plant studies program at NEWFS, then received additional lessons on performing field surveys.

Led by state botanist Paul Somers, the deputized volunteers used confidential information from MNEHSP to find plant populations. The state will use the data they gathered to guide future site management. "The volunteer corps multiplies our ability to maintain an up-to-date set of records. With our current limited staff and budget, the volunteers greatly augment our efforts," said Somers.

Though some sites previously recorded by botanists have been lost to succession, development, and changes in water levels, the workers located 35 of 45 reported rare plant populations. Among their finds were the extremely rare variable sedge (*Carex polymorpha*), certain nut-rushes (*Scleria* spp.), and the regionally rare blazing-star (*Liatris borealis*).

The joint effort came together under the auspices of the New England Plant Conservation Program, an alliance of 68 private institutions and government agencies founded in 1991 to protect New England's endangered plants. It marks the first time volunteers have worked with a state heritage program, a conservation agency usually found in each state. The Massachusetts program will receive funding for at least one more year.

MAGNOLIA PLANTATION'S CARIBBEAN CONNECTION

Magnolia Plantation in Charleston, South Carolina, has added a new tropical garden to commemorate the immigration of its founding family from the West Indies over 300 years ago. Completed last November and now open to the public, the 7,000-square-foot solarium of the Barbados Tropical Garden encloses 100 species and varieties of tropical plants, including palms, bamboos, hibiscus, anthuriums, and bougainvillea.

The plantation is the ancestral home of the Drayton family, who emigrated from Barbados to the Carolinas in the 1670s. In 1681 Thomas Drayton Jr. built Magnolia Plantation and planted its 50-acre garden, now the oldest garden of its size in the United States.

John Drayton Hastie, a ninth-generation descendant of Thomas Drayton Jr. and current owner of the property, got the inspiration for the new tropical garden while on a Barbados gardens tour sponsored by the American Horticultural Society in the spring of 1993. Darrell Linder, Magnolia's director of operations, designed the garden to include both native and non-native plants found in modern-day Barbados.

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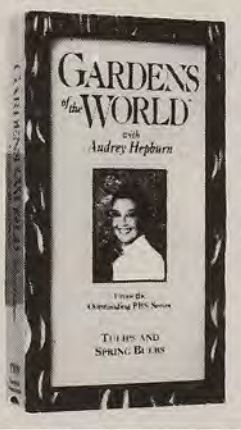

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PENNSYLVANIA GOLD MEDALISTS FOR '94

Since 1988, the Pennsylvania Horticultural Society has named 42 plants as recipients of its Gold Medal—formerly Styer—Plant Awards. These are woody ornamentals that have proven their merit, often over many years, but are still not widely known. The total includes six trees and shrubs selected by a panel of 14 horticulturists as winners for 1994:

An inkberry holly, *Ilex glabra* 'Densa'. This workhorse plant was selected by Carl Flemer in 1940 and introduced to the trade in the early '50s. It isn't flashy, since it has tiny flowers and often fails to produce the ink-blue berries of the species. But 'Densa' is ideal for screening, growing to six feet with dense branching and small shiny leaves. It can tolerate sun or shade, and hot dry sites as well as wet sites.

A summersweet, *Clethra alnifolia* 'Hummingbird'. All forms of this native shrub are becoming more popular. Like the species, 'Hummingbird' bears fragrant white summer flowers, but it is ideal for the small garden because it stays about two feet tall. It was selected by Fred Galle near Hummingbird Lake in Callaway Gardens, Georgia. It is native to wet areas, but will also thrive in drier soil in either sun or shade.

A Japanese plum yew, *Cephalotaxus harringtonia* 'Prostrata'. Here is a shade-loving needled evergreen that makes an ideal ground cover at a height of about two and a half feet and a spread of 12 feet. Originating decades ago at Hillier's Nursery in England, it has the added bonus of being unappetizing to deer.

A flowering cherry, *Prunus* 'Hally Jolivette'. Developed more than 50 years ago by Karl Sax, formerly of the Arnold Arboretum, this cherry stays under 20 feet tall and can be trained as a large shrub. It flowers at only two years old, producing pale pink double blossoms, and offers rose and yellow fall color and the handsome bark typical of many other cherries.

The yellowwood, *Cladrastis kentuckea* (*C. lutea*). This native tree has been known since colonial times, but still is not commonly seen. It produces foot-long clusters of fragrant white flowers in mid- to late May, has distinctive smooth gray bark, and in the fall, clear yellow leaves and flat seed pods.

The Nordmann fir, *Abies nordmanniana*. This fir is somewhat slow to become established, although it transplants easily. Somewhat narrow at a maximum of 50 feet tall and 20 or 25 feet wide, it has dark green foliage, graceful tiered branches and tolerates heat, humidity, and drought.

For a source list of these plants, send a self-addressed, stamped envelope to: Gold Medal Plant Award, The Pennsylvania Horticultural Society, 325 Walnut Street, Philadelphia, PA 19106-2777.

WINNING DAYLILY

It should probably surprise no one: an offspring of the extremely popular 'Stella de Oro' daylily has been named the first All-America Daylily.

The patented 'Black-Eyed Stella' was introduced by Jack Roberson of Grain Valley, Missouri, after 3,000 crosses. It has the golden yellow petals of 'Stella de Oro' but with the added attraction of dark red eyezones. Evaluators for the All-America Daylily Selection Council (AADSC), formed in 1992, reported that it bloomed for 130 days in Missouri, 145 days in North Carolina, 275 days in Florida, and 300 days in California. It is hardy to USDA Zone 5, but unlike 'Stella de Oro', performs well in the far South.

According to Angelo Cerchione, AADSC executive director, the average daylily is hardy across only two zones, and blooms for only 21 days.

HONORED IRIS

The American Iris Society's 1993 Dykes Medal, its most prestigious award, went to 'Edith Wolford', a tall-bearded iris with light canary-colored standards and medium blue-violet falls. A mid-season bloomer, it grows to 35 inches tall with ruffled petals and nine buds on two or three branches. It was introduced in 1986 by Ben Hager of Stockton, California, who has had two previous Dykes Medal winners, both pink. 'Vanity', introduced in 1975, won in 1982, and 'Beverly Sills', introduced in 1979, won in 1985.

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