



The
American
HORTICULTURAL
Magazine

summer 1970 / volume 49 / number 3



Journal of the American Horticultural Society, Inc.

2401 CALVERT STREET, N.W. / WASHINGTON, D. C. 20008



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THE AMERICAN HORTICULTURAL MAGAZINE is the official publication of The American Horticultural Society and is issued during the Winter, Spring, Summer, and Fall quarters. The magazine is included as a benefit of membership in The American Horticultural Society, individual membership dues being \$15.00 a year.

THE AMERICAN HORTICULTURAL MAGAZINE is devoted to the dissemination of knowledge in the science and art of growing ornamental plants, fruits, vegetables, and related subjects. Original papers which increase knowledge of plant materials of economic and aesthetic importance are invited. For manuscript specifications, please address the chairman of the Editorial Committee.

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FRONT COVER ILLUSTRATION

Cross-section of a red maple (*Acer rubrum*) stem with five frost cracks shows the pattern of defect. Though the defect often is only a slight discoloration, the pattern makes it difficult to saw out a board free of discoloration.

BACK COVER ILLUSTRATION

Rose 'Lady Bird Johnson'. Originated by Eldon C. Curtis and to be introduced by Texas Rose Research Foundation and E. V. Kimbrew, rose grower of Wills Point, Texas, in the fall of 1970. A beautiful vivid coral-red hybrid tea originated from a cross of rose 'Peace' by 'Hawaii'.

The Role of the Botanic Garden Today



A botanic garden in downtown Edinburgh, Scotland, celebrated its 300th anniversary in June of this year. There are others, both older and younger, in most major cities of the Old World.

Some of these gardens contribute handsomely to research in the plant sciences. A few sponsor programs in horticultural education. Many have aided horticulture and plant studies through the cultivation and dissemination of new plants. Nearly all are open to and frequented by the public for relaxation and enjoyment. Large or small, they all occupy valuable real estate. As part of their heritage, European botanic gardens have become so treasured by the total citizenry that threats of decimation, closure, or removal would be unthinkable.

Unhappily, in the United States the same situation does not prevail. The open space and the programs of botanic gardens are needed just as much, or more so, to counterbalance the ever-vanishing green of America's concrete cities. But among the gardens we possess, too many have too often been confronted with bitter fights for survival against highways and other encroachments of many kinds. Some battles have been won, some lost, and some are currently in the balance.

Ours has been a very materialistic society, mainly uneducated to values of this sort. Our society has also become a destructive one. Even if urban botanic gardens succeed in their battles against state and local governments, in the present climate they are in danger of strangulation from the costs of policing and protection—or dying slowly from discouragement.

Must this happen? Is the best alternative for botanic gardens and arboreta to avoid the challenges of encroachment, crime, and pollution by removing to a quiet spot in the country on the theory that they can be reached as easily by the right kind of people? For the culture of its plants or for benefit of its research programs, this might be true. But in the interest of society as a whole, we hope that this is not the answer.

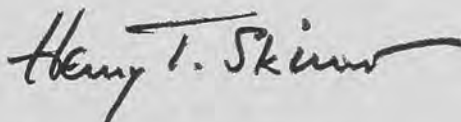
If our cities are to survive as habitable entities, it is essential, as never before, that green space be preserved. If the total environment is to be kept fit for living, it is necessary that our citizenry, from youth up, be educated to an understanding of the natural world. If delinquency and crime are to be overcome, we must awaken the interest of youth to worthwhile leisure pursuits. It used to be said that no Boy Scout had ever landed in Alcatraz. We would be willing to bet that no gardener ever did either!

A botanic garden has the singular potential for aiding immeasurably in solving these problems. It is *green space*. Its duty is to motivate and inspire. It should see that its grounds are artistically, colorfully, and attractively maintained for the recreation and relaxation of a jaded but deserving public. A botanic garden is educational and it can increase its educational impact enormously through joint programming with the local school system, serving essentially as an outdoor laboratory. It can also instruct at the adult level through lecture-demonstration or by the learning-by-doing pattern found so effective at the Brooklyn Botanic Garden. And city-centered botanic gardens can still conduct effective research, even if non city-related breeding, testing, or plant cultural studies might yield better results in a more salubrious environment.

Patterns of program emphasis will, of course, vary. My institution may fall among a minority of gardens which have tended to accord first priority to basic and applied research as far as these can be financed. At the National Arboretum the chief stress happens to fall on botanical and breeding projects. As a federal institution, our educational responsibilities will be met through a planned center for the demonstration of plant related research and information, rather than through organized course work. Elsewhere, education or plant specialization may have priority.

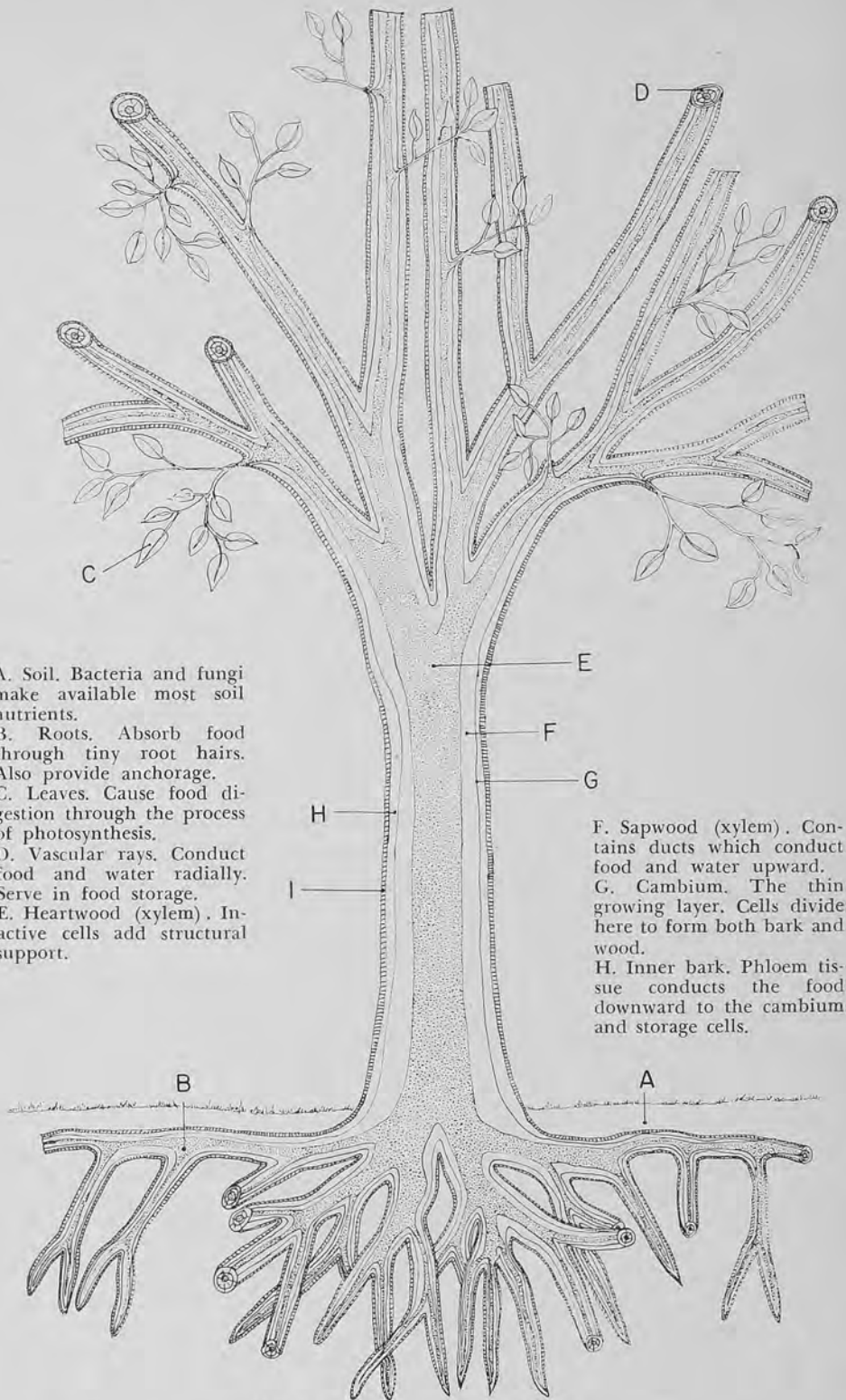
Whatever the main objective or emphasis, good maintenance of a botanic garden ranks high in winning respect and is a proven deterrent to public carelessness. The new vandalism can be curbed only by vigilance and force, pending improved progress in guidance and education.

If the botanic gardens and arboreta of America are faced with challenges, they are also confronted with opportunities, as never before, to advance the cause of horticulture and, beyond this, to improve our social structure in an essential and meaningful way. Whenever these opportunities are met, botanic gardens can bank upon the guarantee of as strong an armor of citizen support as has been so long enjoyed by their counterparts of the Old World.



HENRY T. SKINNER, *Director*

National Arboretum
U. S. Department of Agriculture
Washington, D. C. 20002



A. Soil. Bacteria and fungi make available most soil nutrients.
 B. Roots. Absorb food through tiny root hairs. Also provide anchorage.
 C. Leaves. Cause food digestion through the process of photosynthesis.
 D. Vascular rays. Conduct food and water radially. Serve in food storage.
 E. Heartwood (xylem). Inactive cells add structural support.

F. Sapwood (xylem). Contains ducts which conduct food and water upward.
 G. Cambium. The thin growing layer. Cells divide here to form both bark and wood.
 H. Inner bark. Phloem tissue conducts the food downward to the cambium and storage cells.

MECHANICS OF TREE GROWTH

Drawing by Lillian Nicholson Meyer. Adapted from "How a Tree Grows", by the F. A. Bartlett Tree Expert Co., Stamford, Connecticut.

A Healthy Tree Is a Precious Thing

TOM STEVENSON

The life span of a white oak in a favorable environment is 300 to 700 years. A sugar maple could live up to 500 years, all being well. But because of pollution and other unfavorable factors, today these and most other kinds of trees grow old long before their time.

For a tree, as with man, old age is just a short step away from death. As the tree's rate of growth decreases, wounds heal more slowly. Insects take a heavy toll on vitality, diseases are difficult to shake off, and dead branches appear in ever increasing numbers.

A tree of the right kind in the right place is very valuable and its loss can be a heavy one. It makes good sense to try to prolong its life, and it is possible to do so despite pollution; to put it differently, it is more important to take better care of the tree because of pollution.

The time to start is while the tree is in good health, fairly vigorous, and still able to resist insects and diseases. There is no known fountain of youth for an old tree. Old trees are like old people—the infirmities of age are upon them.

Three of the best things that can be done for mature trees is to fertilize them regularly and to water during periods of drought and prune dead and dying branches. The tree is permanently anchored, for better or worse, to the place it has to stay all its life, unless transplanted. It has to depend on the moisture and nutrients available in that particular place, and in course of time they become in short supply.

Two things other than pollution that

shorten the life of many trees are misapplied weed killing chemicals and rock salt applications for ice and snow control. More about them later.

Wood decay is responsible for the loss of many shade trees. Victims of heart rot are a common sight after severe wind storms. Many trees appeared perfectly healthy before they fell. When they were cut up, big cavities were often found. Wood decay had been in progress for many years.

How does one tell, by examining a tree externally, what it's like internally, whether it is sound or whether it may come tumbling down at any time? Some answers have been provided by recent



Dr. Alex L. Shigo, Principal Mycologist, Northeastern Forest Experiment Station, dissecting a paper birch tree. Dr. Shigo has dissected thousands of trees to study the disease processes that result in discoloration and decay.

Garden columnist for the *Baltimore News American*, *The Washington Post*, and the *Washington Post-Los Angeles Times News Service* which serves more than 300 newspapers throughout North America, with a combined circulation of more than 30,000,000.

pioneer research by Dr. Alex L. Shigo, plant pathologist and principal mycologist, U.S. Forest Service, Northeastern Forest Experiment Station.

He cut into 3,000 trees throughout northern New England, dissecting them. He found that internal patterns of discoloration and decay can be predicted from external signs.

A photo guide, based primarily on Dr. Shigo's studies, has been prepared by USDA Forest Service, Northeastern Forest Experiment Station, 6816 Market Street, Upper Darby, Pennsylvania 19082. More than 10,000 photographs, both black-and-white and color, were taken to record the patterns of discoloration and decay in freshly dissected trees. From these, 100 color photographs were used to illustrate the photo guide which is designed to help in estimating the extent and severity of discoloration and decay in northern hardwood trees. A limited number of copies are available and will be sent free upon request as long as the supply lasts. Write to the Forest Service at the above address, and ask for Research Paper NE-127, 1969.

"I know homeowners are very interested in cavities and wounds in their trees," said Dr. Shigo. "I get these questions asked of me every time I lecture to a general audience. I try to point out that there must be a beginning to these cavities. They begin when the bark is broken and wood is exposed to the atmosphere.

"In the back yard, two types of wounds are common; wounds inflicted during the building of houses, and the wounds formed when branches fall. Often homeowners inflict wounds without realizing that they are starting the processes that may later end in decay. Some common activities that can cause great difficulties to trees are building new driveways, relocating sewer lines, connection of sewer lines from an established septic tank system to a city sewer system, construction of outdoor patios, and many others.

"I feel that the homeowner can do two very important things with wounds. First, he can clean the wound and make

sure that all the rough, torn bark is removed. Second, he can help the tree to help itself heal its wounds. He can do this by fertilizing the tree and watering it during dry periods.

"From our work, I cannot see too much benefit in sealing the cavities with different types of materials. These materials may help to hold the tree upright, but I doubt very much if the materials will help slow the actions of wood-destroying microorganisms in the tree.

"One question that is always asked is, 'What kind of material can I paint on a fresh wound?' There are all kinds of materials on the market and many papers have been written on wound dressings. I have reviewed the literature on the subject, and I know that many studies on wound dressings have been made, but to my knowledge, not one study entailed dissection of the wood to determine the exact condition of the wood behind the wound dressing. I feel that this is the most important part.

"I am sure that many wound dressings are intended more for the owner of the tree than for the tree itself. It is too easy to paint something on the wound and think that you have done your part for the tree. Like so many things in this busy world, this serves to give our conscience relief. I know from limited experience that wound dressings do very little to stop the processes of discoloration and decay.

"At this time, I would include wound dressings in priority 3. I would give priority 1 to cleaning the wound, priority 2 to helping the tree help itself, and priority 3 to applying wound dressings.

"In the research I have planned for next year, I intend to try some new plastics on wounds. If you can seal the injured wood, then we may stand a better chance at holding back the processes of discoloration and decay."

Hormones

During the past few years, misuse of hormone-type weed control materials has caused widespread damage to ornamental trees and shrubs on home properties, including dogwood, sycamore, magnolia, oak, maple, willow, rhododen-

dron, azalea, privet, spruce, and yew. Typical damage occurs as twisting and distortion on the tips of new growth, also browning of new growth. There is a downward cupping of the leaves or a curling upward around the edges. The long term effect is loss of new growth, branch or twig dieback, off-size leaves and stems and, in some cases, death of the plant.

All hormone weed control materials are capable of causing damage to plants. However, according to Walter J. G. Carpenter, Nassau County, New York, cooperative extension agent, "the culprit in at least the majority of cases observed is dicamba (Banvel D). This material has been applied in fertilizer-herbicide (feed and weed) combinations as well as in sprays.

"Dicamba should not be used over the roots of trees and shrubs," he said, "because it has the unique feature that it enters the plant through the root system as well as through the foliage.

"The caution with most herbicides and fertilizer combinations containing Banvel D is, 'Do not apply within the drip line of trees or shrubs.' The drip line is the outside perimeter directly under the outermost tips of the branches. Drip line, unfortunately, is not an adequate term, since a large proportion of the roots of an established plant may be well beyond the drip line. The roots most active in the uptake of beneficial and harmful materials are frequently farthest from the tree. Trees often have 50 per cent or more of their roots in the top six inches of soil, hence soluble herbicides can easily reach the roots with rainfall or irrigation."

Activated charcoal, if applied immediately after a mis-application of dicamba will help nullify the effectiveness of the herbicide. Once it enters the plant, it becomes part of the plant sap and there is nothing that will stop its action. Foliar applications of liquid fertilizer may be beneficial in reviving a damaged plant.

All across the country intensified use of rock salt in winter on highways has caused injury to nearby trees and



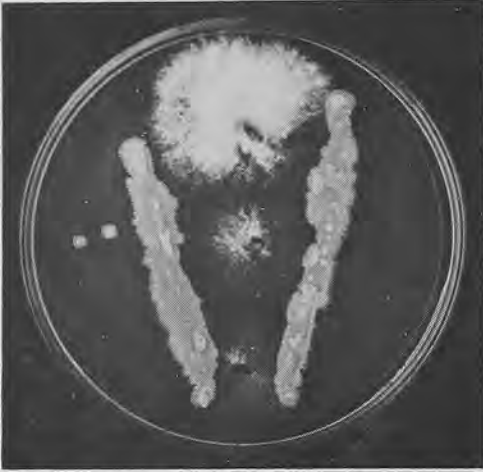
Young maple trees with cankers (localized dead areas), initiated by red squirrel injury. The red squirrels tap the trees for the sap. Sometimes microorganisms infect the wounds and kill portions of the bark forming cankers.

shrubs. Slowly, year after year, roots die. Leaves exhibit a scorch-like symptom and dieback takes over. When the above-ground symptoms are apparent, many salt-injured trees have been too badly hurt to be saved.

Homeowners too often do serious damage to trees and shrubs near drives and walks by over-use of salt. Use of sand, ashes or sawdust is far safer. But if salt is used, try to keep it away from ornamentals as the snow and ice melt.

How Decay Begins

Decay in a tree has been thought to center about three simple events: A tree is injured, a fungus enters, and decay



The bacteria are inhibiting the growth of the decay fungus in culture. The decay fungus is commonly surrounded by this bacterium in trees. This bacterium may help to contain the fungus in living trees.

begins. Dr. Shigo's studies have shown that a complex succession of events must take place before decay can begin.

It works roughly like this: A tree is injured; the tree reacts; chemical changes take place in the wood; the wood discolors; bacteria and non-decay fungi become active; the wood discolors further; decay fungi infect; and, decay begins.

The process is irreversible. And it cannot be shortcut. Decay does not take place until all the other events in the succession have taken place. Decay does not begin until the wood has been discolored. And the succession may stop at any stage; the wood may become discolored but may not decay.

Many of Dr. Shigo's findings have appeared in *Natural History Magazine* March, 1969, a publication of the American Museum of Natural History, in New York, and are extracted with permission. They follow:

Trees are superior organisms. They live longer and grow larger than any other living being. But despite their fine adaptation to life on this planet, and their attributes for longevity, they too, like all organisms, die and decay.

It is primarily the resistance of trees to

death and decay that makes them superior organisms—for while tissues in the center of a tree may be decaying, new ones are forming beneath the bark.

A major portion of the decomposition within a tree results from a great number and variety of microorganisms, mainly bacteria and fungi. In both size and longevity these are the opposite of trees; their life-span is measured in days, and their size in thousandths of an inch. But without them no organic matter would decompose, there would be no re-use of once-living materials, and thus, no continuation of life.

The struggle that takes place between a tree and the collection of microorganisms that break it down is generally similar for all tree species but differ significantly in its specifics. Our knowledge of this subject is most complete in the case of the northern hardwoods: American beech (*Fagus grandifolia*), paper birch (*Betula papyrifera*), yellow birch (*Betula lutea*), sugar maple (*Acer saccharum*), and red maple (*Acer rubrum*).

The wood of these deciduous hardwoods is diffuse porous; the fluid transporting vessels are open-ended and are distributed evenly throughout the wood tissue. The wood tissues formed early in the growing season differ little from those formed later; as a result the annual growth rings are not distinct. The wood is normally bright white, heavy and hard.

Trees can be vigorous or weak, depending on their environmental conditions during their development. Thus, growth rings differ in thickness from year to year. Thick growth rings form during growing seasons when conditions are favorable, while thin rings form during periods of stress. As the older wood cells near the center of the tree age and die, new, young, and vigorous tissues form beneath the bark.

In addition to the concentric growth rings, rows of living cells (rays) radiate from the center of the tree, like spokes in a wheel, transporting food materials and connecting the growth rings to one another. Groups of wood cells are bounded on the inner and outer sides by

the thick cells of the growth rings, and on the sides by the ray cells. The physical strength of these living cells serves as a barrier to the decay processes.

Bark also protects a tree from the physical processes that initiate decay. On some trees, such as the giant sequoias, bark is even fire-resistant. But if the bark is broken, a chemical system takes over, forming a protective barrier around the wound.

The fact that these protective mechanisms function well most of the time is largely responsible for the longevity of trees. When a leaf falls, a branch dies, or a wound is inflicted, the openings generally heal and the protective covering of the tree is re-established. When the barriers do not function properly, disease-causing organisms may enter the tree through openings in the bark either above or below the ground.

Disease

Diseases cause more damage to trees than other destructive agents such as fire and wind. And, from an economic standpoint, the impact that disease makes on the growth and quality of wood, and on the general health of the tree, is even more important than the direct mortality caused by disease microorganisms. But since a tree is made of many sets of tissues, it is possible for one portion of a tree to be in a healthy state while other portions are retarded in growth, discolored, or decayed.

Wounding is the first step in the sequence of events in the decay process. This may occur in one of several ways: Fire may burn the bark; wind, snow, and ice may break branches; sapsuckers and squirrels may attack to feed on the sap; insects may bore into the wood; and animals, such as deer, may eat the bark. Perhaps most wounds are inflicted by man, with his logging operations, highway construction, and a multitude of activities within forested areas.

When a wound is inflicted on a tree, some cells are killed, and others are injured to various degrees. When wood tissue is exposed, many microorganisms soon find their way to the moist wound's



Dissection reveals the pattern of the discoloration. The wood at the base is clear. The column of discoloration from the large stub dwindles toward the base, but joins above with a wider column of discoloration from an older stub above, where the processes are more advanced. The wood formed after the stubs died remains free of discoloration. These discolored tissues are *not* heartwood.

surface. Tiny bits of the fungus and bacteria are in the air at all times, and hundreds of different microorganisms may settle on the injury. Of this number, maybe half will begin to grow, competing against one another for nutrients and space. The number of microorganisms able to survive under the existing conditions is reduced considerably within a matter of days.

Of the few species that survive, even fewer are able to infect (begin to digest) the wood, for a tree forms chemical barriers to infection (phenols), that kill the organisms falling on the wound. Invading organisms must be able to gain food from those cells whose contents have been altered from their healthy state, either by the wounding process itself or by the tree's response to wounding.

With most trees, the original infecting organisms are not decay fungi. The pioneer microorganisms that infect wounds are usually bacteria and non-decay fungi (Ascomycetes, Phycomycetes, and Fungi Imperfecti), which are able to utilize the food materials in the chemically altered cells. Normally, the resistance of the tree is greater than the infecting force of the microorganisms and these pioneer bodies make little headway, even though they have infected the wound.

When a tree is low in vigor or when a wound is particularly severe, the struggle for survival begins to bend in favor of the invaders. As a tree gets older and larger, for instance, its demands for space and nutrients increase; but it is a prisoner to its location. Often in this situation, trees compete with their neighbors, and all begin to weaken. In other cases, constant wounding over many years places too great a burden on the tree's repair systems or the tree may be weakened by man's activities—pollution, construction, logging, and fire. In time these stress factors accumulate, and the tree begins to lose its ability to protect itself.

When the microorganisms begin to utilize and degrade the chemical barriers formed by the tree, invasion—penetration of the healthy wood cells—begins. The microorganisms (now including decay fungi) competing for this new food source interact among themselves and with the exposed wood, resulting in an ever changing environment as the invading organisms move deeper into the tree.

As the process goes on, the cambium layer (the formative tissue during active

growth) continues to form new tissues. However, when a wound occurs, the xylem tissues (the wood) formed by the cambium during the following year's growing season are different in many ways from tissues formed normally; these new xylem cells have thickened walls, more cells are formed with living materials in them, and they are arranged differently.

These and other related changes result in a new barrier wall between the microorganisms in the older tissues and the newly formed tissues. This new barrier wall usually functions effectively, and the invading microorganisms are confined to the older tissues formed when the tree was wounded. They seldom expand into the new tissues formed after wounding.

Now the invading microorganisms in an old wound are trapped, in a sense, by chemical barriers surrounding them in the older tissues, and by chemical and structural barriers between them and the tissues newly formed by the cambium. Apparently the barriers within the older tissues are not as strong (physically or chemically) as those in the younger tissues; the strongest are those formed by the cambium the growing season after wounding. Also, the compartments of wood tissue formed between the rays and growth rings are bounded on four sides, but not on the two ends. Microorganisms from past wounds then move fastest along this vertical path, and generally do not move horizontally outward into newly formed wood cells.

As the organisms make headway inward toward the older and less vigorous tissue, new chemical barriers constantly form in front of them. The tree also forms plugs in the vessels that impair vertical movement. Because of these barriers, definite patterns of invasion occur, and understanding of these barriers within the tree leads to an understanding of the patterns of defects associated with certain types of wounds. Internal defects can be determined by an experienced forester from external indicators such as bulges on a tree's surface. Yet when wood is discolored as a result of

processes initiated by wounds, it is often confused with wood colored as a result of aging.

Some tree species—walnut, oak, and white pine, for example—have a dark central core of true heartwood, wood altered as a result of normal aging and death. The presence of dead wood within the center of such trees is a normal phenomenon and in no way reduces a tree's structural strength. As heartwood cells die, the materials in them are altered chemically and serve as natural preservatives for the wood, causing the heartwood in many species to turn dark in color.

In beech, birch, and maple, and among other hardwood and some coniferous species, dark, central heartwood does not occur. The dark tissues in these trees form only as a result of processes initiated by injuries.

Wounding

One of the most common ways in which a tree is wounded is from the falling of dead branches. When a branch falls, the cellular passageways leading from the branch into the center of the trunk provide a means for microorganisms to enter into the center of the tree. These central tissues then become discolored because of the tree's response to wounding and the tissues may continue to be invaded by microorganisms that intensify the discoloration as long as the branch-stub wound remains open.

Since wood is added yearly to a tree in the form of concentric growth rings,* and since wounds are quickly surrounded by thick-celled barrier walls, invading microorganisms from new wounds do not readily spread outward into newly formed wood. They may move inward, toward the tree's center, until they come into contact with a barrier wall formed by a previous wound. This system always protects the younger, most vigorous tissues as the tree continues to grow. Many times the wounds are severe enough to

*Concentric growth rings are usually well-defined in trees in a temperate climate; but in the tropics, growth rings in many trees are much less defined because of nearly continuous growth, without seasonal dormancy. (Ed.)



This 100-year old paper birch has a 50-year-old wound, which extends to the base of the tree. There is a wound of similar size and age on the opposite side of the tree.

be infected and invaded, but an entire ring of wood may not be completely invaded. Instead, isolated streaks or islands of defect form.

In the discolored columns of wood, the bacteria and non-decay fungi digest the food materials in the altered tissues. These pioneer microorganisms do little damage to the structural portion of the tree, but as they grow through the wood, they leave their waste products about them, and many die, leaving their remains and adding vitamins to the wood. The tissues first altered as a result of the host tree's response to injury are now altered further by growth of the invading microorganisms. In turn, these dead altered wood tissues become potential

food for still other microorganisms—the decay fungi.

Unlike the earlier types of organisms that enter the tree, decay-causing fungi can digest cell walls, thereby weakening the wood. At this stage, bacteria and non-decay and decay fungi compete only among themselves and not with the tree, because all of the tissues within the invaded region are dead. Fungi and bacteria continue to feed upon the tree's dead tissues until decay is complete and only a hollow remains within the tree (although the tissues that formed after the tree was wounded remain healthy). In beech, birch, and maple it may take 40 to 50 years before tissues are completely decayed behind a wound, deep inside a tree. As this occurs, bracket fungi often form on the outside of the trees, drawing nourishment through mycelia (fungus strands), which extend into the decayed portions of the trunk, until the tree stands, hollow and dead.

The cause of death is not often attributed to the many wounds inflicted over the years, or to the many stress

factors that lowered the forces of defense and gave advantage to the invading microorganisms. It is difficult to properly assess all of these factors. Too often, the conspicuous agent that serves the *coup de grace* is marked as the sole cause of death, for example, large bracket fungi on the tree trunk. But no one has ever seen the bacteria and fungi growing through a living tree, and since this process remains largely hidden to view, its significance is generally underrated.

Tree owners today, whether their property includes one or five hundred, have an added responsibility as pollution threatens to cut short the lifespan of many beautiful trees. With proper treatment, a healthy tree may be a joy for hundreds of years. Take good care of it!

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CORRECTIONS

For *Cephalotaxus fortunei* on pages 20 and 21, Winter 1970 issue, read *Cephalotaxus fortunei*.

For *P. orientallis*, page 23, column 2, Winter 1970 issue, read *P. orientalis*.



PHOTOS ALLAN KAIN

A Private Arboretum For The Public

DOROTHY S. ROWE

Why a private arboretum?

There are many fine public botanical gardens in our country, some of them ranking with the best overseas. So why should an amateur bestir himself to develop his garden place as an arboretum, when the result cannot possibly compete with such magnificent organizations?

One of the answers to this question is that many of these great public gardens started as hobbies for their original owners. The Mortons, Cuttings, Shaws, Holdens, DuPonts, Callaways, and others simply loved plants and wanted their homes surrounded by their beauty. Later, civic pride, bolstered by large bank accounts, changed the character of private estate to public benefaction, and we citizens became the benefactors. But it took a private urge, hard work, vision, and growing knowledge to trigger the enterprises.

There seems to be a place today for the middle man in the world of horticulture-minded owners of property. Communities and universities are reluctant to receive gifts unless they are accompanied by adequate endowments. Do not fool yourself that "you can always give it away if it becomes too much of a burden."

4500 Muchmore Road, Cincinnati, Ohio 45243.

Tree box (*Buxus sempervirens* 'Arborescens') specimens about twelve feet tall by front door of our house.

The premise of this article is to encourage those with the urge and resources to develop a bit more than a normal garden. You will have a fine time planting what is appealing; if you do it intelligently, not only do you gain satisfaction, but hopefully others too will be benefited.

This tale of 45 years' trials and errors for two rank amateurs may spare you a few of the errors and give you a glimpse of the rewards gained.

In 1924 we acquired nearly 200 acres of country land in no way suitable to a future arboretum. It was a rundown orchard 15 miles east of Cincinnati, Ohio. Its drawbacks were poor soil, scrubby woodlands, no pond, no northern slope and very few fine old trees to add distinction. But it *was* cheap, had fine views, and we were young, strong, and enthusiastic. So with one farmer and two mules, we started our unknown venture.

We first became enamored of trees when we found how rewarding it was to grow the 4,700 two-year seedlings

presented to us in 1926 by the state of Ohio "for the purpose of holding hill-sides." They were white and Scotch pines, larch, tulip trees, and red oaks.

In 1929 we started collecting any tree or shrub which came our way. This was mistake number one. Now we are more selective about our acquisitions. We are located in Zone V, and buy only those plants hardy in Zones IV, V, VI. Our climate is hot in summer and subject to drought. Winters are cold without benefit of much snow. Officially, temperatures of 109° F in 1934 and -17° F in 1936 are recorded. Rainfall averages 39.5 inches per year. Anything which flourishes for us is tough indeed.

Our limestone-based soils contain splendid fieldstones, impregnated with sea-fossils. These make fine stepping stones, but add planting problems. Experience has taught us to abandon the acid-loving plants. Even meticulously planted azaleas die out.

Now back to our beginning. The place was surveyed and the map was superimposed with numbered blocks, 200 feet square. These are used as location spots in our records.

We feel professional help from skilled landscape architects is most necessary as groundwork planning. They know best where roads and paths should be placed and particularly where different plant families are most likely to succeed. Within these limitations, the owners place individual specimens where they enhance the landscape.

Mistake number two was that plantings were much too close for their maturity potential.

Records

Before talking about some of the fine plants, we must discuss mechanics of our records.

The New Crops Research Branch, U.S. Department of Agriculture, Beltsville, Maryland has sent us small seedlings. In addition to our own buying speers, we have benefited greatly by gifts from other arboreta. New plants are usually very small; so these are either placed in cold frames or in a trial

bed for two or three years until large enough to join their relatives in a permanent location. As new introductions are received they are recorded and labeled.

The labels we use are zinc strips 1-1/4 x 7 inches with a hole at either end for the aluminum wire to attach to the plant. The ink used is one-half butter of antimony and one-half hydrochloric acid. Printing is done by hand. Each label contains four items—botanical name, common name, nursery source or donor, and our own number and the date of acquisition. Often some of these labels last 25 years or more. We were interested to discover that the Savill Garden at Windsor Castle in England used "our" exact labels, placed high on the trees above the notice for the public.

Each named cultivar occupies a page in our record book, giving the information on label, plus family, description of plant as to color, and size. Space is present for future development and remarks. As a counter-check all bills or notations of gifts are posted chronologically in blank books.

The Living Collection

We have almost 2,000 living trees and shrubs, but alas, the "dead" books contain about 800 pages. However, most of these never should have been tried here in the first place.

As to location of permanent plantings, we try to keep the plants in family groups. Ecologically there is no sense in the Rosaceae leading to the Pinaceae, and that into the Oleaceae. Flowering trees and lilacs just look prettier against evergreen backgrounds!

But let's forget mechanics and boast a bit about some of the rewards.

Our so-called "Mt. Vernon"—style home high on a hill promotes a Southern feeling to the garden. The large trees nearby are oak and beech with magnolia and dogwood as understory trees. The ground cover consists of many wild flowers and bulbs by the thousands. Several paths begin at the lawn where collections of viburnums, euonymus and peonies are planted. One path goes to



our only bit of formality, a small rose garden.

Wild flowers are really fine here. *Mertensia*, *Trillium*, blue-eyed Mary (*Collinsia verna*), and columbine are joined by a few sophisticates such as *Epimedium* and hellebores. These make a fine foil for the daffodils. A month later sweet rocket (*Hesperis matronalis*) carpets the woods. Isn't it a joy that there are a few things with "no up-keep" as an added attraction?

The willow oak (*Quercus phellos*) is a beautiful tree which should be planted more often. Unlike the majestic white oak (*Q. alba*), the willow oak is easy to transplant. Its long, thin leaves, borne in profusion on slender branches give a lacy effect, and its autumn coloring is golden yellow. The Turkey oak (*Q. cervinis*) is planted even less. It becomes a large tree of great beauty with comparatively small, serrate, very dark green leaves of a fascinating texture.

Our most exciting oak is the golden English (*Q. robur* 'Concordia'). It is utterly charming in early spring, when the half-grown, small-lobed leaves are greenish gold. It is inconspicuously green in summer. The flower arrangers fight for a branch of this as much as they

Garden of dwarf-growing plants. Center foreground, Kingsville dwarf box (*Buxus microphylla* 'Kingsville Dwarf'). Coniferous evergreens in background include (upper left, clockwise) *Juniperus chinensis* 'Robusta', six feet; *Picea glauca* 'Conica', 13 inches; *Juniperus squamata* 'Loderi', four feet; *Picea pungens* 'Montgomery' (in front of 'Loderi') 30 inches; *Cedrus atlantica* 'Pendula' (in front of 'Montgomery'); and *Chamaecyparis obtusa* 'Nana' (to right of Kingsville box).

do for a piece of dragons-eye pine (*Pinus densiflora* 'Oculis-draconis').

Two distinctive forms of beech give much pleasure, the fenleaf or cutleaf (*Fagus sylvatica* 'Laciniata'). The little-known *F. sylvatica* 'Rosco-marginata' with a pale pink edge to the purplish leaves, I prefer to the better-known 'Tricolor'.

The Schwedler maple (*Acer platanoides* 'Schwedleri') is the maple we never fail to show visitors in April. Its small yellow flowers in handsome drooping clusters contrast with crinkled purple leaves to create a wonderfully exotic effect. After setting red, winged seeds the tree obligingly becomes a more



restful green. There is small welcome for many reddish trees in the summer.

One of the finest large trees is the Chinese elm (*Ulmus parvifolia*). It is interesting at any season. Its form is good, the small dark green leaves are particularly clean looking and persist until after Thanksgiving. In winter the fine branches make a pretty pattern against the sky, but it is hard to cast your eye upward because the trunk is so intriguing. The bark is gray, and exfoliates to reveal irregular patches of orange-yellow. An added attraction is that the Chinese elm is not subject to any of the elm diseases.

Among the magnolias, *Magnolia* × *loebneri* 'Merrill' is a favorite because it flowers early, is extremely hardy, and flowers well nearly every year. Three-inch wide white flowers, each with eight or ten petals, literally cover the tree before the leaves appear. It is easy to layer the lower branches, and these flower about three years sooner than plants propagated by grafting or vegetative cuttings. *Magnolia cordata* with yellow flowers two inches wide came to us originally from Georgia. It is not too large to be in one end of our so-called

Double-flowered dogwood (*Cornus florida* 'Pluribracteata') is truly breathtaking in flower. Double-flowered dogwood at close range (upper right).

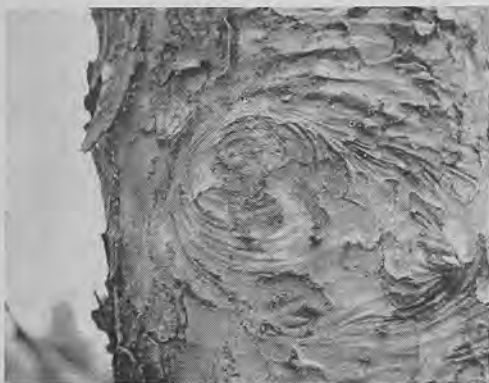
"garden," a big perennial bed containing everything from fine evergreens to Sylvia Saunders peonies, or astilbes, tulips, and chrysanthemums.

The double-flowered dogwood (*Cornus florida* 'Pluribracteata') is truly breathtaking in flower—a mountain spilling avalanches of creamy white blooms to the ground.

Plants of the rose family fill the "Ten-acre Field." The road which bisects it is much traveled when the 150 cultivars of crabapples are in bloom or fruit. Among this group of beautiful trees, we can mention only a few o'd favorites, or newcomers well worth watching. It is hard to improve on the first one to come in bloom, for the manchurian crab (*Malus baccata* var. *mandshurica*) is a giant bridal bouquet of single white flowers. A shiny little red apple replaces each bloom, remaining until January, often making an exciting effect against the snow.

Another fine early crabapple is the hybrid midget crab (*M.* × *micromalus*)

Chinese elm (*Ulmus parvifolia*). Our finest specimen is 54 feet tall with a 73 inch circumference. Introduced as an eight to ten inch plant in April, 1935, from the U.S. Department of Agriculture as P.I. 112116. Bark of Chinese elm (lower left) is gray and exfoliates to reveal irregular patches of orange-yellow. The tree is elegant in winter because of this beautiful bark.



whose fadeless pink blossoms appear on a small vase-shaped tree with nice gray bark. *M.* × *purpurea* 'Lemoinei' the darkest red in leaf and flower is a fine foil next to pale pinks. Other fine crab-apples are: *M.* 'Henry F. DuPont', a strong pink with particularly handsome buds.

M. 'Dorothea' blooms when young; it is a small tree, with double fadeless pink blooms and yellow fruit. A new super-prize is *M.* 'Mary Potter', a small tree, giving a fine display of pink blooms which later turn white. *M.* 'White Angel' has large brownish fruit persisting all winter.

M. 'Van Eseltine' is fastigiate. Its upright branches are laden with double pink flowers. Superb!

M. 'Golden Hornet' and *M.* 'Goldfinch' are two fine yellow-fruited trees.

M. 'Edinburgh Red' has very shiny, brilliant red fruit.

M. *coronaria* 'Nieuwlandiana', is an improved Bechtel crab; it reminds one of a large tree bearing thousands of double pink roses.

The late Arie F. den Boer, the crab ap-

ple expert, was nice enough to name a new crabapple after the author. She is particularly proud of her handsome namesake, *M.* 'Dorothy Rowe'. My plants are not full-grown but everything about them is good—green leaves, many large, creamy-white flowers, and largish, bright red and extremely shiny fruit which persist for a long time.

Before leaving the Rose family we must mention three outstanding flowering cherries. *Prunus* × *yedoensis* 'Akebono' has a particularly appropriate common name "Daybreak". Its single petals are the palest of pink and make an unforgettable picture against a blue April sky. *P.* *serrulata* 'Gyoiko' has its greenish yellow flowers. *P.* × 'Hally Jolivet', more properly a large shrub, is one of the most charming of all. It has a longer blooming period than the tree cherries; pink buds and small double white flowers with red centers cover the plant at blooming time.

Conifers

The other plants to which we point with pride are the conifers—all 580 of

them. They should occupy twice the space allotted to them. It is difficult to visualize the eventual spacing requirements of a six inch cutting.

Our 100 junipers (*Juniperus*) are fun because they can be creepers two inches high or green spires 40 feet high. The junipers vary greatly in shape and size and in color of the foliage; berries are blue, gray, or green.

Pines (*Pinus*) are represented by several outstanding specimens. A very handsome weeping white pine (*Pinus strobus* 'Pendula') is much admired, as is the big-coned Himalayan (*P. griffithii*). We have one freak which we hope will become famous—a white pine (*P. strobus*) with six, seven, eight, nine, or ten needles in a bundle. If its progeny continue to come true to form it will be named 'Camargo', since the original parent tree is growing on our golf course of that name.

Our best hemlock is *Tsuga canadensis* 'Strangeri', very compact, and a strong dark green tree. *T. canadensis* 'Cole's Prostrate' lives in the Dwarf Garden with many fine little freaks of nature. One of these is a full-grown oak four feet high called *Q. havardii*. Another is *Cedrus atlantica* 'Pendula', with a main eight-inch trunk supporting two side branches. It gives the appearance of a fine candelabrum when the new cones stand upright across the top.

Another choice dwarf conifer is a weeping Lebanon cedar (*C. libani* 'Sargentii'), a real creeper. It can look up to its 35 foot relative from Turkey, *C. libani* var. *stenocoma* which rewarded us last year with its first pistillate cones, in 32 years' residence.

Arborvitae are dull plants but the leaves of *Thuja occidentalis* 'Spiralis' have a pretty twist; and there are two huge beauties, *T. plicata*, the western red cedar, and its even handsomer cultivar (*T. plicata* 'Atrovirens'), which forms a dark green spire.

Spruces (*Picea*) and firs (*Abies*) do not care for our hot summers but we do own a few outstanding examples. *Picea abies* 'Pendula' can only be described as a freakish giant ghost waving his several



***Picea abies* 'Pendula'. A fine specimen of the Norway spruce with weeping branches.**

arms in different directions. By far the finest fir is *Abies concolor* 'Violacea', a large symmetrical cone-shaped plant with much bluer needles than the well-known "blue spruces."

Only one yew, *Taxus* × *media* 'Wymanii' is worth a rave; those on either side of our front door are truly fine. Only six feet tall, their spread is 15 1/2 feet—a good increase in value for the \$2 paid for them in 1938 when they were 18 inches each way.

Chamaecyparis (falsecypress) is the most rewarding of the evergreens for its infinite number of forms and when cut, they remain fresh in the house for over two months. We may recommend

the following as outstanding: *Chamaecyparis obtusa* 'Nana' with its fan-like leaves set at odd angles; *C. thyoides*, whose tiny, pink cones in winter resemble miniature closed rosebuds; and the great Lawson cypress, *C. lawsoniana*, whose delicate branches swoop down and then up. Another treasure, *C. obtusa* 'Fernspray', has small branches that resemble plumes.

Of course the long-lost *Metasequoia glyptostroboides* is with us as in every botanical garden we have seen from Oslo to Yalta. One wonders why it apparently disappeared from many parts of the earth for thousands of years and now is seemingly happy in every climate where planted.

We have tried to point out the pleasures of developing a small arboretum.

The great satisfaction to us has been that children in classes, young people starting their home planting, garden-clubbers, and beauty-lovers in general, have an accessible spot to pursue their various interests. It has been a real joy to others. When they can't all be running off to Washington's National Arboretum or to the Arnold Arboretum in Boston, they are always welcome at "Annesdale."

A last word of advice: try to specialize, and do not spread yourself too thin. It is really important to know that there is a fine collection of rhododendron, or conifers, or the rose family, or a bog garden, in a certain part of the country; and even if you are only amateurs, your experience may be of value to some experts.



***Malus* 'Dorothy Rowe'. Mrs. Rowe stands beside a plant named in her honor by the late Arie den Boer, crabapple expert from Des Moines, Iowa. Flowers are creamy white.**

Hybridizing Roses As a Hobby

TOM STEVENSON

A new rose named 'Lady Bird Johnson' will be introduced in the fall of 1970 by the Texas Rose Research Foundation and E. V. Kimbrew, Wills Point, Texas, rose grower. It will be listed in the Fall 1970 catalogue of Kimbrew Roses. A beautiful vivid coral-red hybrid tea, it was hybridized by an amateur, Eldon C. Curtis, 51-year old Dallas, Texas, insurance salesman.

It is a spectacular example of what an amateur can accomplish in the field of hybridization. I happen to know the details of Mr. Curtis' success because I was asked by Mrs. Johnson to pass upon the merits of the rose, and help her decide whether or not to allow her name to be given to it.

Mr. Curtis had been growing roses, about 50 plants, in his garden for 10 years when, for Christmas 1959, his wife Mildred, gave him *The Rockwells' Complete Book of Roses*. Chapter 15, "Creating Your Own Roses," appealed to him particularly.

No-wise daunted by the odds against him, he launched himself into a rose hybridization avocation.

He harvested his first rose seeds in the fall of 1960, about three dozen of them, the results of a cross of rose 'Peace' by 'Hawaii'. The seeds were planted in his backyard on January 1, 1961. The seedlings started to come up in March and by May 1 he had his first bloom.

The very first seedling to bloom was white with orange spots and extremely fragrant. The color gradually changed to a vivid orange. This first rose has been tested, patented, and named 'Miss Hillcrest', in honor of the beautiful Hillcrest Rose Garden in Dallas. It was introduced in the fall of 1969 by Kimbrew. It is a vibrant orange-coral, turning to orange-red, an intensely fragrant hybrid tea, with dark green, glossy, disease resistant foliage and about 50 large petals. A planting of these roses is

featured in the Hillcrest Rose Garden.

In 1963 Mr. Curtis made a cross of two orange roses, using 'Montezuma' because of its vigor, for the female parent, and 'Hawaii', because of its color and fragrance, for the male parent.

One of the seedlings from this cross was orange when it bloomed, but it would stay in bud, never opening, and would last for weeks. He decided to destroy it, but first told Kimbrew about it. Kimbrew asked for some budwood from it to use in his rose fields for testing.

Kimbrew tested the rose for two years and became really excited about it the second year it bloomed. When budded to multiflora understock, the rose produced long, urn-shaped buds on long stems, with beautiful orange to orange-red blooms of unusual form and substance.

Dr. Eldon Lyle, plant pathologist and director of the Texas Rose Research Foundation, was asked to look at the rose. He, too, became excited over the lovely blooms. He had an idea. Wouldn't it be wonderful if a rose created in Texas and grown and introduced by a Texas organization could be named for a famous fellow Texan who had done so much for beautification!

He phoned Mrs. Lyndon Johnson at the White House, asking permission to name the rose for her. "The rose is similar to 'Tropicana' (an All-America award winner)," he told her, "but has much better foliage and bush characteristics. Also, it is not quite as thorny. I feel sure this new rose will become popular and a winner as a queen in many a rose show."

Mrs. Johnson asked Irving Williams, chief White House horticulturist, to bring her some 'Tropicana' blooms from the President's rose garden.

"Why that's one of my favorite roses," she said, upon seeing them. "I'm thrilled."

Permission was subsequently granted, and thus began the long, detailed process of naming, registering and patenting a new flower.

"I'm glad this went to an amateur," Mrs. Johnson said. "After all, I'm just an amateur myself."

Ninety percent of the royalty from the 'Lady Bird Johnson' rose has been assigned to the Texas Rose Research Foundation to further their great work in rose research that benefits all who love roses.

Most of the following rose gardens will have 'Miss Hillcrest' and all will have 'Lady Bird Johnson' bushes in bloom in summer of 1970.

- Weed Park
Muscatine, Iowa
- Samuell-Grand Rose Garden
Dallas, Texas
- Hillcrest Rose Garden
Dallas, Texas
- Zilker Municipal Rose Garden
Austin, Texas
- Memphis Municipal Rose Garden
Memphis, Tennessee
- Kingwood Center
West Mansfield, Ohio
- Iowa State University
Ames, Iowa
- Louisville Rose Garden
Louisville, Kentucky
- Missouri Botanical Garden
St. Louis, Missouri
- Parks Department
Lansing, Michigan
- Louisiana State University
Baton Rouge, Louisiana
- Municipal Garden
Salt Lake City, Utah
- Tulsa Municipal Rose Garden
Tulsa, Oklahoma
- Governor's Mansion
Austin, Texas
- White House Rose Garden
Washington, D.C.

- Bon Aire Park
North Arlington, Virginia
- Hodges Garden
Many, Louisiana

The accompanying article by Eldon C. Curtis tells how he did it. Anyone can follow the same steps.



Lady Bird Johnson loves roses. They are among her favorite flowers. Above, in a 1963 photo taken at The Elms, suburban Washington home of the then Vice President and Mrs. Johnson, she discusses with Tom Stevenson, long time friend and fellow gardener, how to cut roses to take indoors.—The Editors.

'Lady Bird Johnson'

A New Rose

ELDON C. CURTIS

Hybridizing is a tedious, time-consuming hobby. It requires a great amount of patience, but its reward is an even greater amount of pleasure.

Perhaps a poet could find the appropriate words to describe the infinite pleasure of taking part in the creation of a beautiful rose, or the thrill and joy of seeing a new flower come to life—one that never before existed. The pleasure in knowing you have caused a new rose to be born cannot be described. You must actually experience the joy hybridizing gives you. Perhaps, even as I do, you may find yourself referring to your "new-borns" as "my babies."

Should you decide to enter the intriguing field of hybridizing, set up a goal. Try to visualize the type of rose you would like to create and use parents that have these characteristics. You should consider vigor, constant bloom, color, fragrance, form, and disease resistance. You cannot, however, pick out these characteristics and pass them on to your seedlings at will. Almost anything can happen, and often does.

Many thousands of different roses have been crossed to bring modern roses

Amateur hybridizer—creator of the 'Lady Bird Johnson' rose. 6914 Kennison Drive, Dallas, Texas 75227.



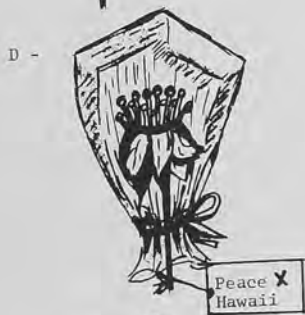
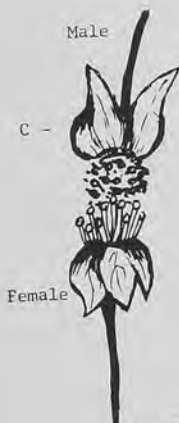
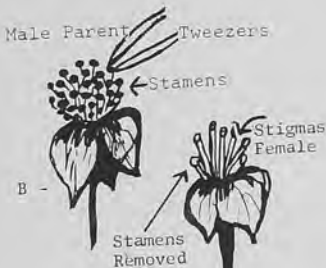
PHOTO CHRONICLE MAGAZINE

Eldon C. Curtis plants a 'Lady Bird Johnson' rosebush in the garden of his home in Dallas, Texas.

to our gardens. Characteristics from either parentage may show up in your seedlings. You may cross two double roses and get seedlings with single blooms; or you may get roses with many more petals than either parent. You might cross a yellow rose with a white and get a red seedling, as any color in the ancestry of either parent may result; or you may get an entirely different color. This creates the suspense of hybridizing.

All rose blooms are perfect, e.g. have both male and female parts in the same flower. Consequently, each flower is likely to self-fertilize, unless the hybridizer takes measures to prevent it. The stamens carry the pollen, and represent the male part of the bloom; the stigmas (tip of pistils) in the center of the rose bloom receive the pollen. This act of pollination leads to fertilization of the young ovaries and to the development of fertile rose seeds.

The female rose parent determines strength and vigor of the plant while the male parent brings in color, fragrance, and form of the bloom. To illustrate, rose 'Peace' makes an excellent female parent because of its strength and vigor; while rose 'Tropicana' is a good male parent because of its color, fragrance,



A. Rose on female parent at right stage to remove petals for the crossing. Bloom should be one-third to one-half open. The female parent bush will produce the rose seeds. Carefully remove all petals without damaging the stamens and stigmas.

B. After all the petals are removed, remove the stamens (pollen carriers) with tweezers, leaving the stigmas exposed. Again, be careful not to damage the stigmas.

C. Take bloom from rose selected as male parent that is fully open and check with magnifying glass to see that pollen (dust-like particles) is present on the stamens. Carefully remove all petals, leaving a two inch stem as a handle. Brush carefully over the stigmas of the female bloom several times. Check with magnifying glass to be sure pollen has been deposited on all stigmas.

D. Place plastic bag over the pollinated bloom and secure with plastic covered wire to prevent bees or the wind from placing unwanted pollen on your cross. Be sure small holes are punched in the plastic bag to prevent heat build-up. Leave for about one week, then remove.

E. If cross has "taken," seed pod or rose hip develops and when fully matured, is removed from plant. Seed pods are ripe when they turn red, orange or yellow. Cut seed pod in half and carefully remove seeds. Dry seeds thoroughly before storing so they will not mold. It's a good idea to store them in a container covered with plastic punched with air holes.

Plant seeds, which have been dusted with a rooting hormone powder, about 1/4 inch deep, around January 1st in Texas (later, of course, in the north) in soil made up with 1/3 sand, 1/3 compost or black earth, and 1/3 peat moss. Put a 1/8 inch layer of sphagnum peat moss on soil surface after planting as a precaution against damping off. Freezing and thawing will make the seeds germinate faster; they should start coming up in about two months. Cover seedlings with plastic if freeze is to occur after plants start coming up. Remove plastic on warm days.

and form. In addition, 'Tropicana' is also vigorous and very disease resistant.

For the beginner, it would be best to use 'Hawaii' as the female parent because of the high yield in developing hips, more than in any other rose I have used.

Hybridizing should be completed by the end of May in the south, southwest, and lower west coast, and by July 15 in all other areas. Crossing will not be successful in extremely hot weather.

The necessary equipment for hybridizing is:

1. A pair of tweezers.
2. Magnifying glass. (10 X)
3. Plastic envelopes (I use three inch corners cut from plastic covers on shirts returned from the laundry). Punch small holes to allow air circulation.
4. A notebook.
5. Plastic covered wire.
6. Small pointed scissors.

On the plant of the cultivar selected as the *female* parent, choose a bud which is fully developed and with the petals one-third to one-half open.

Carefully remove all of the petals, starting with the outside row, being careful not to damage the central group of pistils surrounded by rows of stamens. You can see the tips of the stamens without the dustlike pollen which will appear when the flower is almost completely open.

Next, with the tweezers or scissors, remove all of the stamens very carefully, so as not to injure the pistils. This is known as emasculation. The female parent is now ready to receive the pollen of the male parent.

Immediately, secure a bloom of the *male* parent you have previously selected which has a sufficient amount of pollen to make the crossing. Remove all petals, leaving about two inches of stem. Here, either by keen eyesight or the magnifying glass, check to make sure there is plenty of pollen on the stamens, then carefully brush the pollen of the male parent across the stigmas of the female parent to make the cross. You have now completed the first step

toward creating a new flower.

Carefully place a plastic envelope around the flower stem and secure with plastic covered wire. I use the plastic covered wire used to seal bread wrappers because they come in several different colors. By assigning a color to each bloom when hybridizing, the plastic covered wire may be left on the stem when removing the plastic envelope and you have a record of the cross: the color of the plastic wire indicates the male parent; the bush with the hip is always the female parent. Be sure the plastic covered wire is sufficiently tight to prevent bees from entering with pollen taken from some other rose, but not tight enough to damage the flower stem.

If you are hybridizing several cultivars, keep a record of each cross. You should record in your notebook each male parent designated by the color of the plastic wire. Of course, if you are using the same female and male parents in all crosses, a detailed record is not necessary.

If the cross "takes", the hip or the round base of the flower will stay green and begin to grow. If the cross does not "take", the hip will shrivel, turn yellow, then brown and finally fall off.

The hips containing the rose seeds will mature in three or four months. When mature, the hips will turn red, yellow or orange; the sepals usually fall off. I have read recently that carefully wrapping the hips with aluminum foil will hasten ripening of the hip. This would be important in short summer areas, but I haven't had the opportunity to try it and am unable to judge the procedure.

Be sure to harvest your seeds before fall rains and freezing weather turn them black and damage the seeds.

Carefully cut the hips in half so as not to damage the seeds. I usually cut through the skin of the hip with a table knife and separate the halves with my fingernails. It is necessary to dry the seeds thoroughly, before putting them in containers marked with the parentage. I use plastic covers with several ice pick holes in them to allow for air circulation

and to prevent molding of the seeds or you may store them in small glass or plastic jars without cover.

It is not necessary to have a greenhouse in which to grow your seedlings. I prepare my seedling bed in my back yard, using one-third sand, one-third rich compost or black soil and one-third peat moss thoroughly mixed. Use eight inch aluminum edging around the bed, leaving at least two inches above the ground. My seedling bed measures four feet square, which is small, but by planting the seeds one inch apart and the rows with one inch separation, I can handle a great number of seeds. Usually, not more than 50 percent of the seeds will germinate. Dust the seeds with a rooting hormone powder before planting them one-fourth inch deep and spaced about one inch apart, around New Year's Day. After planting, cover the entire bed with sphagnum moss about one-eighth inch deep to prevent the bed from drying out too quickly. Keep the soil moist by spraying daily with a fine mist. Be extremely careful not to wash the small seeds out of the soil.

Leave your seedling bed open to the weather. Actually, freezing and thawing several times, cause the seeds to germinate earlier. The seeds will start to germinate on warm days in your area. The new plants do not look like roses; but the third or fourth leaves, although tiny, will be shaped like true rose leaves. Should freezing weather occur after your seedlings come up, a simple piece of plastic over the entire bed, anchored with rocks or bricks, will protect the plants to as low as 15° F. Tiny plants can withstand surprisingly cold weather. I have had very young seedlings that withstood 28° F with no protection and they were not killed.

First Blooms

Seedlings will bloom when they are

surprisingly small. I have had plants in flower when they were two inches tall with blooms the size of an English pea or larger. These first blooms are not indicative of the final color or form of the rose; but if fragrant, the fragrance will remain. The tiny rose seedlings may go through many changes, sometimes including change of color, during the first two years. When the plants are about one inch tall, remove them from the seedling bed with a tablespoon full of soil. Then transplant them to an area with more space and the same soil mixture as the seedling bed soil. I prefer to leave all my seedlings in the seedling bed the first summer and move them the following spring. Since my hybridizing operation is on a small scale, I destroy seedlings that I do not like. I believe roses should be fragrant, and I destroy all non-fragrant ones unless they have unusual form or color.

Usually by the third season the color and form will be the true rose you have created. You can hasten this process by budding the seedling into wild root stock. Most seedlings improve when budded into wild root stock but some will be good subjects for destruction even though they may have been beautiful as seedling plants.

Keep your seedling bed moist all summer. I am unable to explain why, but when fall freezes come, more seedlings will come up. They can be potted in clay pots, taken into the house and if placed in a sunny window, may bloom for you. Then in the spring, move them outside.

It is indeed gratifying to create my own roses and it is my hope that many of you will try your hand at hybridizing. Who knows, Lady Luck might smile at you; and you may have originated the most beautiful Queen of Flowers ever to grace the world!

Breeding Chrysanthemums as Pot Plants

BRIAN LOVELIDGE

Development of the chrysanthemum (*Chrysanthemum morifolium*) for mass production as a pot plant gave the pot plant industries in both the U.S.A. and the United Kingdom a considerable impetus which helped pave the way for expanding sales of other lines. Yet despite the increasing demand for pot plants in these countries, none have yet been specially bred for economic mass production.

This situation will not last very much longer, thanks to the foresight and initiative of Allan Jackson of Wye College Horticultural Department, London University, England. Five years ago he launched an ambitious new program with the aim of producing the first purpose-bred pot plant. His first series of cultivars is to be launched in March, 1971.

"Although cyclamen is one of the most magnificent of pot plants it takes over a year to produce. This is far too long and most pot plants have the same fault," he says. "The chrysanthemum is the exception because it has a short growing period and is very responsive to controlled day length, but it was never specially bred as a potted plant."

Although Mr. Jackson's new pot plant is a chrysanthemum, so many of its characters differ from the common ornamental type that he would prefer to give it a completely different name. He is well on the way to producing a pot chrysanthemum that is dwarfing (and so needs no treatment with a growth retardant) with suppressed apical dominance (so that a single cutting produces a well-branched, saleable plant), and the ability to efficiently utilize winter light and thus allow year-round production.

"Such a plant will be more economical to grow than the current ornamental



PHOTO BRIAN LOVELIDGE

Allan Jackson holds two new quill chrysanthemums which were grown from single cuttings and illustrate the freely branching habit derived from the original Chinese parent seedling.

varieties of chrysanthemums used," he explains. "Labour and production costs will be lower and bench population higher. Our new varieties have proved to be long-lasting, flowering for four to five weeks, and they travel very well. The fact that they have a strong branching characteristic means that only one cutting per pot is necessary and of course, one stock plant will produce many cuttings for propagation."

The breeding program is based on a primitive dwarf Chinese seedling, with a strong branching habit, which has been grown at the college since before World War II. The original plant was grown from seed imported from China. It's pale pink ray flowers with quilled florets have an absolutely solid cushion center.

The seedling is very responsive to

Agricultural Journalist, Newdene, Station Road, Staplehurst, Tonbridge, Kent, England.

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controlled day length but it is not suitable for winter use because it is a "light inefficient" cultivar and rosettes under low light intensity. When grown under artificial conditions its color fades and the cushion center disappears. Self-pollination is impossible because the cultivar is totally self-sterile.

As it stood, the chrysanthemum had little or no commercial value nor could it be used in an independent breeding program. To exploit its undoubted potential, Mr. Jackson decided to cross it with an anemone-centered standard American cultivar, 'Long Island Beauty', which is white with a yellow center. This cross produced 90 seedlings, most of which were singles (two showed anemone characteristics) and a lot had a nine-week flowering period.

Mr. Jackson was impressed by the seedlings' pot plant potential. To obtain a fuller expression of the desirable characters, he back-crossed selected seedlings using the Chinese seedling as the recurrent parent. The progeny showed nearly all the characters he was looking for, with various degrees of dwarfing and apical dominance and all types of center and ray florets, including a range of quilling.

The seedlings produced by the pale pink and white parents displayed a remarkable range of delicate colors and illustrated the tremendously heterozygous nature of the chrysanthemum. However, the breeder felt that for commercial purposes stronger colors were necessary. He then crossed the Chinese seedling with an intensely red Victorian show single, and the progeny were in turn crossed with the original back-crosses.

The results of the latest cross came into flower in September 1969. Once again the range of different types was enormous including a number of strong red cultivars which promise to make first-class pot plants.

Mr. Jackson is hoping that a number of these crosses will prove suitable for year-round production which means they must overcome the weakness of the Chinese parent by flowering during the

December-March period. In fact, the next generation of seedlings are being bred with this aim in mind.

So that advantage may be taken of BGA* royalties, the new cultivars are being propagated and sold through Frampton Nurseries of Sussex, one of Britain's largest propagators. This firm, in fact, has done much of the final assessment of the first five cultivars selected for release. These are the result of the first back-cross and include 'Wye Pixie' (old gold), 'Wye Sprite' (pale mauve), 'Wye Nymph' (deep pink), 'Wye Wraith' (pale lavender), and 'Wye Sylph' (white). Each carries the BGA prefix and is virus-tested. All the cultivars have Chinese quill florets and apart from 'Wye Sylph', which has an anemone center, they are all singles. The flowering period is 10 to 11 weeks.

"These varieties are intended for summer flowering," says Mr. Jackson. "No disbudding is necessary and although the use of B9 is not essential on some of the varieties, Framptons are recommending that they are all treated with this material. Only one cutting per pot is needed but more can be used if required."

"I believe that the chrysanthemum is the best basis for new pot plants because of its response to light," he adds. "I also believe that new pot plants could be produced requiring no manual manipulation. That means no stopping, disbudding or growth retardant, and one cutting per pot. Such a plant could surely enliven the limited pot plant scene in Britain, the United States, and other countries and could be advantageously adapted to supermarket and chain store sales."

After he has produced a range of year-round cultivars, Mr. Jackson is not sure how much further he will take the breeding program. He feels that having introduced and begun to exploit a "new idea", further development might be best handed over to commercial breeders.

*Breeder-Grower Association. A privately-run, European organization which makes private contracts similar to patents granted by the American Government.

Operation Green Triangles . . . A Seattle Success Story

KATHLEEN V. NELSON

Every city has its "triangles"—weedy, unkempt plots, criss-crossed with paths or littered with trash, observed with distaste by visitor and resident alike. They can be made inconspicuous or, better still, transformed into delightful assets for the area and for the city. How one city recognized and solved this problem is told in authoritative detail by Mrs. Kathleen V. Nelson, Chairman, Operation Triangle, Seattle Beautiful, Seattle Chamber of Commerce.

NEIL W. STUART, *Editor*

Pocket parks are the natural progeny of an increased awareness in urban America of a vanishing open space. Like so much flotsam and jetsam in every city, small neglected parcels of public land offer great potential for beauty and recreation when skillfully landscaped.

Seattle, whose hills and lakes force many streets to transverse at oblique angles, has virtually hundreds of street triangles.

By virtue of their location mid-street, street triangles when improved are best suited to passive uses such as transit stops and sitting parks, in addition to their primary function of separating pedestrian and auto. Totally paving them compromises the latter by making them less visible, and is both aesthetical and ecologically unsatisfactory.

In 1965, concerned Seattle Chamber of Commerce volunteers and city officials sat down to devise a program to bring the professional and public-

planting amateur into a working partnership. Operation Triangle, coordinated by the Chamber's Seattle Beautification Committee in cooperation with City Engineering, emerged. Over a period of months, Chamber volunteers made on-site surveys at over 200 locations, inventorying their characteristics, mapping and numbering them. From this list, one site in each of five Engineering Districts was selected to comprise a Demonstration Planting Study, fully financed by the city. Three of the demonstration sites are illustrated below.

Operation Triangle began literally at the end—which is maintenance—and worked back to the beginning. From the outset, three criteria were established: (1) Continued professional maintenance of the site by the city must be assured; (2) The program was unsuited to do-it-yourself home-gardening methods; and (3) neither the city nor the community could finance the program alone.

Programming for low maintenance forced an early consortium between City Engineering landscape architects and the ornamental plant horticulturist in seeking answers to such problems as (1) the increasing lack of manpower skilled in urban landscape gardening concepts; (2) decreasing availability of municipal funds for maintenance purposes; and (3) finding in quantity, and in acceptable quality, plant materials compatible with these criteria as well as the special prob-

Chairman, Operation Triangle, Seattle Beautiful, Seattle Chamber of Commerce, Seattle, Washington.

(Adapted from "Horticulture in Action," a presentation at the 24th Annual Williamsburg Garden Symposium, Williamsburg, Virginia, March 15-20, 1970)



H-8. BEFORE PHOTO SEATTLE ENGINEERING

Far from the city center, where travel time for a maintenance contractor was one of many a considerations, this site ideally suited plant materials which prefer "neglect" . . . *Ilex crenata* 'Helleri' and sweet gum *Liquidambar styraciflua*.



AFTER PHOTO TELL PHOTO

lems* inherent in putting plant materials into a cement-surrounded, carbon monoxide-concentrated, hostile mid-street environment. Grass was virtually eliminated as a groundcover because of its high maintenance characteristics which city studies showed cost three times as much to maintain as evergreen groundcovers.

*Heights, spreads, and "shy" distances of plant materials at maturity which meet Traffic Engineering standards; unsheltered exposure; poor soil conditions; "tidyness" of plant material in public setting at all seasons; endurance to high concentration of carbon monoxide; natural resistance to vandalism by virtue of the plant's own characteristics, low-maintenance characteristics, etc.

The ornamental plant horticulturist became the program's "insurance man", working with the landscape architect—whose forte is design, not plant physiology. Before planting, he must analyze soils on these sites which are usually of marginal fertility, poorly drained, and concrete-hard. He then recommends soil amendments, watering techniques, and fertilization procedures and suggests those materials best suited to existing conditions.

He suggests plants which can mature gracefully in hostile urban conditions with virtually no maintenance and yet offer the landscape architect interesting and colorful choices. Horticulturists from the American Horticulture Society and the University of Washington Arboretum consult regularly with Operation Triangle.

Site preparation—the "unglamorous" part of building pocket parks—varies from site to site, but may include everything from adjusting the size and location of a triangle and installing new curbs and sidewalks to relocating or removing power poles, or installing of a water line and meter (all sites are served by a hose bib, costly sprinkler systems being unnecessary in Seattle's climate when the proper plant materials are chosen). City Engineering planting specifications are voluminous, with highly specific instructions on the staking of trees, preparation of the planting pocket, weed control measures involving commercial products and bark mulch.

Triangles, despite their name, may be circular, small, large, flat, steeply sloped, have any kind of exposure, soil, condition or drainage. Those done to date range in size from 620 square feet to 6,600 square feet. The neighborhoods in which they "live" also differ greatly—precluding any "stock" design solutions.

For example, H-8 illustrated here, is a small, flat site with an arid southwestern exposure. Ideally suited for this situation is (*Ilex crenata* 'Helleri') Japanese dwarf holly which thrives with little maintenance, and prefers neglect to lush garden conditions. Sweet gum (*Liquidambar styraciflua*) is also happy in such a

situation and will lend fall color to a semi-business arterial.

Quite a different set of conditions was to be found on C-1, a twin site of 2,700 square feet whose proximity to Lake Washington across the street provided a cool and humid "climate" to which (*Gaultheria shallon*) salal was well-matched. Forming a dense cover, salal will actually "keep house" by catching and concealing litter . . . a companion role for plants like salal who also serve as "housekeepers of the air". Complementing the groundcover, and equally at home in these conditions, is (*Cornus florida*) flowering dogwood a native eastern dogwood much more suitable to this open exposure than Seattle's native *Cornus nuttallii*.

While most street triangles offer little in the way of protection from drying winds and sun, F-18 was an exception.

Here, 3,700 square feet of land sloped steeply to the southeast, offering sufficient protection to provide a happy home for *Rhaphiolepis ovata* (round-leaf yedo raphiolepis which likes both sun and an absence of pedestrians to threaten its brittle branches. The pitch of the site showcases the May blooms which cover this plant. An old sidewalk was broken out and used as a retaining wall. Canada hemlock (*Tsuga canadensis*), more easily transplanted than its native cousin (*T. heterophylla*), also prefers protection from the prevailing southwest and northerly winds. A clean tree, it is a good candidate for public planting. Its free-flowing line forms a graceful foil for the brilliant fall accent of the (*Oxydendrum arboreum*) sorrel tree which shares the site. This tree is mistakenly overlooked by many landscape architects because it lacks a "set" form easily reduced to the drawing board. But its combined hardiness, beauty, insect and blight resistance and pollution tolerance recommend it for public planting.

The 11 sites completed to date have required only the most minimal care since their planting.

From an organizational standpoint, the program comprises the efforts of three groups:



C-1.

BEFORE PHOTO SEATTLE ENGINEERING

The cool humid location of this site across the street from Lake Washington provides a compatible home for salal, *Gaultheria shallon*, and dogwood, *Cornus florida*. A bus shelter replaces the weed-patch at the end of the line.



AFTER PHOTO TELL PHOTO

(1) *The City Engineering Department* which provides professionals in landscape architecture, traffic, and engineering and executes all design and working drawings, intercedes with the Design Commission and City Council, and administers all contracts.

(2) *The Seattle Beautiful Operation Triangle Committee*: This standing steering committee of approximately 15 well-informed men and women engaged in private landscape practice, ornamental plant horticulture, architecture, and business is the key to Operation Triangle, acting as a two-way catalyst for action by the city government and the community.

Meeting monthly year-round, its self-imposed task is to structure and develop the program on a citywide level, educate and inspire others toward their goal and serve as liaison between City Hall and the community with tremendous economies of time and effort for all concerned. Vast duplication of effort is thus avoided.

A packaged "program" for interested communities has been prepared by the committee—a highly detailed Program Kit† which tells how to do it and why, fund-raising ideas, preliminary designs of the site which have been pre-selected with community assistance and which may be modified within certain limitations, and a preliminary cost estimate.

(3) *The Local Community*: Through either an ad hoc or standing community organization such as a service club, garden club, or women's organization, they provide the final vital link by implementing the program on a particular site in their area.

The Triangle Committee provides a list of members of the American Society of Landscape Architects local chapter who have volunteered to act as consultants to community groups in conferences with the city and the Operation Triangle horticulturist. While consultants do no design, he guides the local organization in making design decisions.

Financing

Presently, the city assumes two-thirds of the total cost of each park while the local community provides the remaining one-third. Small seed grants of \$25 to \$200 donated to Operation Triangle from major business or other sources have somewhat reduced the communities financial burden. In at least one instance, a Seattle family financed one-

†Available for \$2.00 each from the Seattle Chamber of Commerce, 215 Columbia, Seattle, Washington 98104.



F-18.

BEFORE PHOTO SEATTLE ENGINEERING

The sheltered environment of this steeply sloped site provides a natural habitat for a background of Canadian hemlock, *Tsuga canadensis*, accented by the scarlet of sour-wood, *Oxydendrum arboreum*, and the low cover of May-flowered *Rhaphiolepis umbellata*.

AFTER PHOTO TELL PHOTO



third of a park in a low-income area, a practice the committee hopes to encourage on at least one site annually.

Currently, the funding formula is undergoing review in the hope that the city portion can be increased to accelerate the program and make it more equitable to communities having numerous problem sites or limited financial resources.

While Operation Triangle has focused its concern on a specific target, its graphic demonstration of the aesthetic and economic values inherent in a close working relationship between the landscape architect and horticulturist bodes well for the future success of public planting in those cities visionary enough to implement such a practice.

CONTROL OF NUTSEdge

L. L. DANIELSON

The composition of plant communities in forests and meadows, undisturbed by man, changes in cycles that may involve years or centuries. The survival of species in these communities is dependent on their ability to withstand exposure to severe environmental stresses such as extreme cold, heat, wind, drought, floods, plant disease epidemics, insect infestations, and others, individually or in various combinations.

The plant species called weeds that plague our lives as gardeners are developed by this rigorous system of selection. These plants are therefore well equipped to compete with our delicate and carefully nurtured vegetables and ornamentals. They can therefore quickly spread over an entire garden unless we exercise great care to recognize and remove them as soon as they appear.

Description

The perennial weeds are among the most aggressive species we must combat. These include Bermudagrass (*Cynodon dactylon* (L.) Pers.), mugwort (*Artemisia vulgaris* L.), poison ivy (*Toxicodendron radicans* (L.) Kuntze), stinging nettle (*Urtica dioica* L.), nutsedge (*Cyperus* spp.), and others. Seeds or fragments of these plants may be brought into our gardens by birds, wind, rain-water drainage, and in topsoil and soil mixtures. Introduction can be minimized by heat sterilizing (steaming) or fumigating all soils and organic fertilizers and mulches that may contain the plants or seeds.

The nutsedges are among the most common of these perennial weeds that are rapidly becoming serious pests in home gardens and lawns. They are ag-

Plant Physiologist, Crops Research Division, Agricultural Research Service, U.S. Department of Agriculture, Beltsville, Maryland.



FROM A DRAWING BY REGINA HUGHES,
U. S. DEPARTMENT OF AGRICULTURE

Fig. 1. Purple nutsedge (*Cyperus rotundus*). A. Vegetative portion of the plant with sprouting tubers on the rhizomes. Flower stalk with terminal group of flower spikes. B. Flower spikelet. C. Ovate flower scales.

gressive and quickly spreading plants that crowd out domestic turfgrasses, vegetables, and low-growing ornamentals. They belong to the *Cyperaceae* or sedge family. Two species are of special concern. Purple nutsedge (*Cyperus rotundus* L.) is a perennial herbaceous plant and is prevalent in the southeastern, southern, and southwestern states (Figure 1). Yellow nutsedge (*Cyperus esculentus* L.) is found in the eastern, northern, and western states. There is some overlapping geographically of these species.

Purple nutsedge reproduces by seeds and tuber-bearing rhizomes. The numerous small brown tubers have a nutlike appearance. The triangular stems are four to 24 inches tall, depending on the



PHOTO U. S. DEPARTMENT OF AGRICULTURE

Fig. 2. Purple nutsedge plant in early vegetative stage of growth.

habitat. Leaves are $\frac{1}{8}$ - to $\frac{1}{4}$ -inch wide. The flowering spikelets are chestnut brown to purple, and this, combined with the nutlike tubers, gives the plant its common name. The spikelets are arranged in an umbel. The dull olive gray to brown seeds (achenes) are oblong. Flowering occurs from July to October. Nutsedge thrives in fertile gardens and crop fields. Once it becomes established in a small area in a garden or field, the stolons spread rapidly in all directions. Mechanical or hand cultivation also spreads the seeds, stolons, tubers, and small plants. Immediate action should be taken when this weed first appears in the garden, and should not be abandoned until eradication is complete.

Yellow nutsedge differs slightly from purple nutsedge in color and some

physical characteristics, but its growth habit and structure are quite similar. The same control methods are effective for both species.

Control

Controlling nutsedge in the home garden area by hand is possible if the pest is recognized when it is first introduced (Figure 2). Spading the soil to a depth of two to three feet in the area followed by careful sifting to remove all stems, rhizomes, and tubers is imperative. Diligent removal of all new shoots as they appear will maintain control.

In many instances, the large amount of labor involved and the necessity for repeated removal of new growth makes hand methods impractical as a means of controlling large infestations of nutsedge. Application of 3-amino-*s*-triazole [amitrole] herbicide may be used to safely control nutsedge in woody ornamental plantings under these conditions. Do not use amitrole in fruit or vegetable plantings. Carefully controlled and directed sprays of amitrole applied at low pressure on the actively growing nutsedge foliage are convenient to use and are effective on relatively large patches of the weed. The spray must not contact the foliage of valuable plants. Isolated occasional nutsedge plants can be treated with the amitrole spray mixture applied with a small, hand-held sprayer.

Careful direction of the herbicide solution into the crown whorls of the individual plants localizes the treatments so that injury to neighboring valuable plants and turf is avoided. Follow-up treatment, continual vigilance, and quick action are the only means of keeping the garden free of the sedges.

All agricultural chemicals recommended for use in this report have been registered by the U.S. Department of Agriculture. They should be applied in accordance with the directions on the manufacturer's label as registered under the Federal Insecticide, Fungicide, and Rodenticide Act.

The Committee on Nomenclature and Registration of the American Horticultural Society has been charged with keeping the membership informed on name changes of important horticultural plants. Each note will give the correct name for a plant in cultivation and explain the reasons for the new name. A bibliography will be provided for those readers who wish more detailed information.

The correct name is essential for communication and for information storage and retrieval. For this reason we use scientific names which are understood internationally rather than local common names which vary from county to county and from language to language. While name changes may seem bothersome, each change reflects an improvement in botanical knowledge. Often for horticultural material, especially, the change results from the correct identification of a plant in the trade which was unfortunately introduced under an incorrect name. Other name changes come from in-depth studies and a new understanding of the taxonomy of the plant; the same species may have been named several times in different parts of the world and the oldest valid name must be adopted; in a monographic study it may be found that two or more species or genera must be combined or a species or genus divided; in the former case the oldest valid name is adopted, in the latter, new names are given to new taxa recognized.

We communicate about plants through their names. For this reason information concerning plant names is important to readers of this Magazine.

Variety Or Cultivar?

FREDERICK G. MEYER

The terms "variety" and "cultivar" are familiar to readers of this Magazine.

Traditionally, the named selections of cultivated plants have been referred to simply as varieties, for example, rose, daylily, tomato, and apple varieties.

With the more recent coining of the term cultivar, a clear understanding of the terms is needed. The question is not *whether* variety or cultivar should be used but *how* these terms should be applied to plants.

Variety, it should be noted, is a botanical term more aptly applied to wild plants; whereas, cultivar is a horticultural term more aptly applied to named selections of cultivated plants.

Chairman, Editorial Committee. Botanist in Charge of the Herbarium. U.S. National Arboretum, Washington, D.C. 20002.

Botanical Varieties

Variety is a unit of classification used by botanists to subdivide a species occurring in the wild. Botanists recognize wild varieties in nature as true breeding populations consisting of many individual plants all with a similar aspect (facies). Botanical varieties differ from each other in various ways, and each occupies its own separate geographical location. The concept of variety in the botanical sense may be illustrated by *Magnolia virginiana* with two varieties: var. *australis*, an evergreen tree confined to the lower South and var. *virginiana*, a large deciduous shrub distributed from the upper South to Cape Cod, Massachusetts. The variety name applies equally to all plants of the variety growing together in

the wild, including the rogues that gardeners would normally discard.

Names of wild varieties are always in Latin, and the naming procedure is fully explained in the *International Code of Botanical Nomenclature* (1966).

Cultivar

The term cultivar was coined from two words, *cultivated* and *variety*, to apply to named selections of cultivated plants. Cultivar first was adopted and officially published in the *International Code of Nomenclature of Cultivated Plants* (1952). At last, horticulturists and gardeners had a term that did not conflict with botanical terminology. Cultivar replaces variety when used in a horticultural sense for all named clones and some seed propagated inbreds. We simply speak of daylily, rose, blue grass, tomato, and wheat cultivars. The older terms "horticultural variety" and "cultivated variety" are synonymous with the new term cultivar.

Cultivars are of two kinds:

1. Those vegetatively (asexually) reproduced as clones. Named selections (clones) of rose, iris, apple, etc. are familiar to everyone. Clones are perpetuated by vegetative propagation from a single original mother plant. This practice maintains the clear identity of a named clone.

Clones are usually reproduced by cuttings, divisions, or grafts. Examples of clones: *Magnolia* 'Lennei', *Zoysia* 'Meyer', rose 'Peace', apple 'Jonathan'.

2. Those propagated sexually from seeds (inbreds). Highly inbred seed lines may retain their distinguishing characteristics even after many generations. The common garden flowers, vegetables, and field crops of our grandfathers' day were mostly inbreds that reproduce relatively true from seeds. Examples of inbred cultivars from seed are 'Wisconsin 53A' maize, 'Spencer' sweet peas, 'Crego' asters, 'Kentucky Wonder' beans, and 'Rutgers' tomatoes. More recently, F_1 hybrid flowers, vegetables, and field crops have been developed as still another kind of cultivar propagated by seed. (See *American Horticultural Mag-*

azine 49 (2) : 75. 1970.)

Cultivars normally result from plant breeding and selection work, although some cultivars have been brought into cultivation directly from a wild source as individual plants, then named, and perpetuated by vegetative propagation as a clone. Plants may be grown under their botanical names in cultivation, but cultivar names cannot be applied to plants in their natural wild habitats.

A cultivar name published on or after January 1, 1959 must be a "fancy" name in any modern language, such as rose 'Peace', but not in Latin. A name in Latin, if published in conformity with the Botanical Code, before, on, or after January 1, 1959, for a plant later considered to be a cultivar, may be retained in the original spelling. All new cultivar names must be published in accordance with the *International Code of Nomenclature of Cultivated Plants* (1969). The Cultivated Code establishes either of two ways to distinguish a cultivar name: 1) by enclosing the name in single quotation marks, or 2) by placing the abbreviation cv. before the cultivar name. Examples: *Hemerocallis* 'Luxury Lace' or *Hemerocallis* cv. Luxury Lace.

The term cultivar applies equally, of course, to all named selections of horticultural and economic plants — ornamentals, fruits, vegetables, trees, field, and forage crops, and others. All vegetables in the supermarket, for example, have cultivar names, as do the named selections of wheat, alfalfa, and blue grass on the farm. The best rubber from Malaya and the black pepper from India come from named clones (cultivars).

The American Horticultural Society supports the Horticultural Code and the Botanical Code referred to earlier. The Society makes these distinctions between the terms variety and cultivar wherever applicable in its publications. Authors are asked to cooperate when submitting manuscripts.

Copies of the *International Code of Nomenclature of Cultivated Plants* (1969) are available from Society headquarters. Price \$1.50, single copy. Special price, bulk copies.



PHOTO ROCHE

Primula sieboldii

Primula sieboldii

In many gardens where primulas are difficult to grow, *Primula sieboldii* may prove to be the exception. Its advantage seems to lie in its ability to become dormant during the hot weather when so many primulas pine and dwindle under the onslaught of heat and drought.

The oblong-ovate leaves, lobed, toothed and wrinkled, are three or more inches long. The clusters of flowers, pink, lilac-pink, rose, purple, or sparkling white, are supported by pedicels six or more inches high. The petals may be rather plain, with a simple notch in the top of each, but on some plants they are variously cut into lacy or fringed patterns. These diversifications give latitude for the choice of the most appealing forms and colors.

Primula sieboldii thrives in woody, humusy soil with light shade or protection from the hottest sun of the day. Each spring the clump is a little larger than it was the year before, enlarging irregularly from extensions of the rhizomes. It is not necessary to divide the clumps as often as it is to divide those primulas which form tight masses of many crowns, and it is a simpler

operation. Chunks can quickly be cut off and planted in new places.

Our first plants came from the old Ellwanger garden in Rochester, New York. There were masses of the whitest flowers all through the perennial beds, and it seems to me I remember they were getting quite a bit of sun. This primrose must have been growing there for decades, probably since the heyday of the famous old Ellwanger and Barry nursery. Through the years they must have been divided many times. It was lilac time when they were in bloom—the last part of May in Rochester.

Miss Helen Ellwanger had dug up a clump which Mrs. Donald Wyman and I shared. When we got home, I divided my half into three, and planted them near some Christmas roses, where they thrive. Mrs. Wyman also divided hers into three, and they flourish in her garden near Boston. We both cherish the association with that particular garden, and the charming lady who generously shared with us.

GERTRUDE S. WISTER

735 Harvard Ave.

Swarthmore, Pennsylvania 19081

A New Sweetberry Honeysuckle From Hokkaido, Japan

What happens when sweetberry honeysuckle (*Lonicera caerulea*) seedlings, derived from plants pioneering on rocky outcroppings are introduced to a fertile corn belt clay loam? Will plants from seed collected in a cool ocean fog belt withstand the desiccation of searing summer, chilling winter winds, and rapid temperature fluctuations of central Iowa in the fall or spring? Does tender and actively growing foliage and twig tissue have the inherent ability to withstand spring frosts, summer heat, or the sudden temperature changes associated with autumnal polar cold fronts? If prolonged record-breaking summer, fall and winter drought, should follow scant spring rains, as in 1966 at Ames, Iowa, will our test plants be alive next April?

With the flush of each spring's new growth such questions seemed less relevant. In the early spring of 1969 trial plants of sweetberry honeysuckle blossomed and renewed their foliage and twigs for the seventh year at the North Central Regional Plant Introduction farm, Iowa Agriculture and Home Economics Experiment Station, Ames, Iowa. This plant introduction was obtained during an ornamental plant investigation in Japan in 1961. The U.S. Department of Agriculture, Agricultural Research Service; the Longwood Foundation, Longwood Gardens, Kennet Square, Penn.; and various Japanese agencies and authorities cooperated in this exploration for plant materials of value to American horticulture. John L. Creech, plant explorer, Crops Research Division, ARS, found this sweetberry honeysuckle in July 1961, at 2,400 feet elevation on Mt. Apoi in the Hidaka Range of Hokkaido, Japan.

In October 1962, 70 1-year-old seedlings were sent to Ames by the U.S. Plant Introduction Station, Glenn Dale, Md., for evaluation (P.I. 276114). After initial planting in 1963 and resetting of scattered plants the following spring, 34 plants survived. Observations presented herein were made on these plants.



PHOTOS, U.S. DEPARTMENT OF AGRICULTURE

Fig. 1. Small white tubular flowers of the sweetberry honeysuckle, *Lonicera caerulea*, P. I. 276114, appear in April and early May.

Even though the weather was still unsettled in early April, pairs of slightly nodding, creamy-white, regular 5-lobed, tubular-funnelform flowers, about $\frac{1}{2}$ inch long, appeared at the end of the previous year's twigs (Figure 1). These flowers and the forthcoming fruits were soon partly hidden by the rapidly growing new leaves. The leaves were deciduous, oval to ovate or elliptic, obovate or oblong, $1\frac{3}{4}$ to $2\frac{3}{4}$ inches long, obuse, with a small point, usually rounded at the base, smooth. The color and



Fig. 2. Sweetberry honeysuckle fruit in May and June has eye appeal and is edible.



Fig. 3. Many plants of *Lonicera caerulea*, were of small mound growth habit in five years.

shape of the edible sweetberry honeysuckle fruits on a more productive plant are easily seen in Figure 2. Uneaten fruits tend to drop by mid-July.

Nearly all plants tested were many-branched and hemispherical in outline. Two typical five-year-old plants are shown in Figure 3. One plant among 34 was upright-spreading. Three plants were nondescript, sparingly and irregularly branched.

Eight years from seed, these shrubs were less than 3 feet tall, varying from 16 to 36 inches in height with a spread of 20 to 52 inches. Nearly one-third of the plants were found to have new yellow twigs; the remaining plants had light pink twigs. Branches contained solid white pith. Regardless of the initial color, maturing branches turned brown.

Dead spots were noted on the leaves of many plants. Such spotting was unsightly and thus detrimental to the ornamental value of the plants. Four plants showed little injury to the foliage; six plants appeared to have sustained severe injury, while spotting injury to the leaves of the remaining plants was moderate.

The plants with relatively "clean" foliage, and with other valuable ornamental attributes, will be propagated at the Regional Station and grown for further observation; planted in a coordinated trial by cooperating ornamental plant specialists in the 13 states of the North Central Region, and observed periodi-

cally for plant performance by trial co-operators.

These observations should provide a sound basis for understanding the adaptation of this outstanding ornamental sweetberry honeysuckle from Hokkaido, Japan, to climate and soil conditions of the north central region of the United States.

ALBERT F. DODGE
Horticulturist
Crops Research Division
ARS, U. S. Department
of Agriculture
Ames, Iowa

***Carpenteria* for Eastern United States**

I realize it is useless to belabor a dead horse, but perhaps it may be worthwhile to point out another very important difference between west coast and east coast horticulture. I am referring to Milan Rafayko's good note on *Carpenteria californica* in the Fall 1969 issue of *The American Horticultural Magazine*, p. 187. Rafayko very rightly points out that there is more than temperature differences between the two areas and that Californian plants are adapted to arid conditions with often an alkaline soil



PHOTOS B. O. MULLIGAN

Fig. 1. *Carpenteria californica* in bloom in *Cistus* area in the University of Washington Arboretum, with J. A. Witt. Plants eight feet tall, 13 years old.

reaction, while the East and Southeast receives more ample rain and is apt to have neutral to acid soils. This is correct, but there is, I feel, one factor which makes it difficult to raise plants from California in the eastern United States.

Seattle is not known for its arid climate; in fact, it has a reputation for rain that it does not deserve. We have an average annual precipitation of 40.08 inches in the University of Washington Arboretum located in the heart of the city. Nor does it have soils with a pH above seven, as evidenced by the large number of rhododendrons, camellias and other acid-soil plants for which the area is famous. While Seattle has a mild climate, temperatures can and do get very low. The minimum temperature recorded in the Arboretum was 3°F in January, 1950. Many winters since that time have had similar low temperatures when the maximum stayed below freezing for several days.

Despite these climatic and soil factors which seem nearer mid-Atlantic or southeastern conditions than Californian, the University of Washington Arboretum has been very successful in growing *Carpenteria californica*. Plants of this beautiful genus were first set out in a variety of sites in 1952. The largest is now over ten feet tall and puts on a magnificent display of its large white fragrant flowers each year. *Carpenteria* is not the only Californian plant that grows well in Seattle. A partial list would include *Ceanothus* and *Arctostaphylos* in variety, several of the evergreen oaks such as *Quercus wislizenii*, *Q. chrysolepis*, and *Q. vaccinifolia*, and the majority of the conifers endemic to California.

This brings me back to my original point. Why does *Carpenteria* thrive in Seattle, 600 miles north of its native home, while it needs special care in that section of the east coast which is essentially at the same latitude as central California? I believe the answer lies in the seasonal distribution of rainfall, if all other factors, climatic or edaphic, are more or less equal.

The three west coast states have an



Fig. 2. *Carpenteria californica* flowers, 2½ inches in diameter, slightly lemon scented. June 18, 1968. University of Washington Arboretum.

extended period of summer drought, followed by heavy winter precipitation. The Arboretum's weather records show that about 58 percent of its precipitation comes during November, December, January, and February, while only 12 percent falls from June through September. The same pattern follows for California and Oregon. If I may use Milan Rafayko's home state of Kentucky as an example of eastern rainfall distribution I find, according to the 1941 *Yearbook of Agriculture*, p. 886, that it receives 45.45 inches of precipitation annually. The four winter months and the four summer months get nearly equal amounts, roughly 34 percent and 32 percent, respectively. To re-emphasize this point, Seattle records an average of 2.66 inches of rain in June, July, and August compared to Kentucky's 11.99 inches.

It seems evident that plants which evolved under arid summer conditions will find it difficult to adjust to mesic summers. They have developed a physiological pattern of rest, or at least slow growth, during the drought periods that can be tampered with only to the detriment of the plant. In Seattle we must not irrigate the Californians even during the driest summer. They should

grow with a southern or western exposure, and on well-drained soil. Under this treatment any species that will tolerate our cold winters will grow well and even luxuriantly.

In view of this important discrepancy between east and west coast climates, may I suggest a cultural practice which might make it easier for the east coast gardener to raise *Carpenteria* or other "hardy" Californians? Pick out a site that is essentially protected from rain—under an overhanging eave would be ideal with a western or southern exposure and with sharp drainage. Water is necessary during the winter and early spring but never during the summer. Using this technique I believe that many fine species from areas of summer drought could be grown successfully in eastern United States.

J. A. WITT

University of Washington Arboretum
Seattle, Washington 98105

Mountain Fleece Flower Reidentified (*Polygonum cuspidatum* 'Crimson Beauty')

One early October day about ten years ago, a man from southern Virginia came into my office with a beautiful bouquet of plumes with small scarlet flowers on stems two to three feet long. He said the plant was not uncommon in gardens of Virginia. He wanted to grow it commercially for the sprays of beautiful crimson flowers to be used for dried bouquets. Could I tell him the name of the plant?

I told him the plant certainly was a kind of *Polygonum*, known as smartweed or knotwood. The plants resembled *P. cuspidatum* (syn. *P. sieboldii*), a plant native of Japan which is commonly called Mexican bamboo in the United States. Other characters of the plant left me puzzled. The plant, my friend said, was clump-forming and not rhizomatous as in typical Mexican bamboo. Furthermore, the plant had beautiful scarlet flowers unlike anything I knew for *P. cuspidatum*. Typical Mexican bamboo has white, not scarlet, flowers.

Anyone who has ever grown *P. cuspidatum* knows how quickly the plant gets



PHOTO F. G. MEYER

***Polygonum cuspidatum* 'Crimson Beauty' at Blandy Experimental Farm (O. E. White Arboretum) Boyce, Clarke County, Virginia, September 28, 1969.**

out of control because of the vigorous, fast growing rhizomes. Few plants are as unruly and as difficult to control as the Mexican bamboo. It is in the same class as bindweed. If the plant seen that day was, indeed, a form of *P. cuspidatum*, certainly here was a selection of much ornamental merit deserving wider attention in gardens generally.

I studied the plant to some extent and then laid it aside. A search for a description and a name in the standard horticultural references did not help. This seemed unusual for a plant already fairly widely cultivated. I quickly eliminated the few cultivars of *P. cuspidatum* already known in cultivation, such as 'Reynoutria', a dwarf growing plant with spreading rhizomes, 'Variegatum' which has creamy white-variegated leaves, and 'Spectabile' with leaves marbled with green, white, and red. Also, eliminated was var. *compactum*, a wild variety from Japan growing up to three feet tall with long creeping rhizomes.

Time went on and I kept seeing the plant each fall in my travels around Maryland and Virginia. About two years ago, Mr. Jacques Legendre of Gulf Stream Nursery, Wachapreague, Virginia, sent in more of the same plant for identification. He said he was trying to

build up stock to sell of what he considered to be a first-rate garden plant. He could not find a name for it.

Finally I found what appeared to be a perfect match for the plant in the nursery catalogue for 1947 of Bobbink and Atkins, Rutherford, New Jersey. It was listed as "*Polygonum* 'Crimson Beauty' (*Polygonum amplexicaule rubra*), mountain fleece-flower." The plant was described as "a different and unusual herbaceous shrub, displaying a shower of striking red fleecy flowers during September. When fully established will grow six to eight feet." This described the flower perfectly, but the non-rhizomatous habit was not mentioned. The plant was misidentified as *P. amplexicaule rubra*, which is a low growing perennial, two to three feet in height. The name *rubra* was probably invented merely to indicate the flower color which normally is red in *P. amplexicaule*. The plant listed as cultivar 'Ruby' of *Polygonum amplexicaule* in "Plant Buyers Guide" (edited by Edwin F. Steffek, fifth edition, 1949) was an error for *rubra*.

The plant I have seen in Maryland and Virginia gardens plus those submitted by my friend ten years ago and those sent by Mr. Legendre more recently, I am convinced, are of the clone 'Crimson Beauty'. The plant is merely a selection of *Polygonum cuspidatum*. Bobbink and Atkins listed the plant for several years in their catalogues through 1950. Recently, I learned that the Spring Hill Nurseries Co. (Mr. Thomas B. Kyle Jr., Vice President), Tipp City, Ohio, offer plants of 'Crimson Beauty' under the name *Polygonum*, flowering bamboo. Mr. Legendre of Gulf Stream Nursery, expects to offer it in 1971. Certainly it is a plant that deserves much wider popularity. The plant is fully described here for the first time.

Description

Polygonum cuspidatum Sieb. & Zucc. 'Crimson Beauty' (listed as *Polygonum amplexicaule rubra* 'Crimson Beauty' in Bobbink & Atkins Catalogue, 1947.)

The female clone 'Crimson Beauty' is a selection of unknown origin. The

plant is clump-forming (caespitose); the rootstalk is thick and woody. Old clumps may attain six to eight feet in diameter with stems six to eight feet tall, erect or often arching, branched in the upper part; the stems are green with hollow internodes and partitions at the nodes. The leaves are rounded ovate, $2\frac{3}{4}$ inches to four inches long, $1\frac{5}{8}$ inches to $2\frac{5}{8}$ inches wide, truncate to slightly wedge-shaped at the base, abruptly sharp-pointed at the tip, dark green above, lighter beneath; petioles are $\frac{1}{2}$ to $\frac{5}{8}$ inches long. The flowers are borne in forked panicles two inches to four inches long in the axiles of leaves, predominantly female with scarlet perianth lobes when young, fading to pink to nearly white in age. The ovary is crimson, later fading to almost white or light pink at maturity. Occasionally abortive male flowers, pink to nearly white, may occur on side branches in some plants. Fruit with viable seeds is not normally produced in this clone.

The scarlet flowers produced in September and October and the clump-forming habit of the plant distinguish the clone clearly from all other known variants of *P. cuspidatum*.

Dried cut branches of 'Crimson Beauty' make an elegant winter bouquet alone or mixed with dried grasses. Branches should be cut and leaves removed soon after flowers open and then air dried. Flowering panicles are then visible on the bare stems. Flowers retain their scarlet color indefinitely in dried arrangements.

Culture

Plants of 'Crimson Beauty' grow well in any well-drained garden soil of good tilth. Plants grow and flower best in full sun. Division of the woody crown is the normal method of propagation to perpetuate the clone true to name. Probably the plant could also be propagated vegetatively from cuttings under mist in early summer. This clone should be hardy in all areas where *P. cuspidatum* is grown.

FREDERICK G. MEYER
U. S. National Arboretum
Washington, D. C. 20002

Flowering Vines of the World

Edwin A. Menninger, Hearthsides Press. New York. 1970. 410 pages. Illustrated. \$25.00.

Those of us who are familiar with Dr. Menninger's earlier books, such as *Flowering Trees of the World*, *Fantastic Trees*, and *Seaside Gardens of the World*, have been looking forward eagerly to the appearance of the present work. This sumptuous volume is now at hand and even a casual examination will convince the recipient that it is worthy of its predecessors.

In an opening chapter the author calls attention to the great disparity between the number of vines native to the temperate regions as contrasted with those found in the tropics (Burma alone has 870 species). The reason for this is, of course, the fierce competition for light which exists in the tropical rain forest.

He then defines a vine (no simple task), discusses the various mechanisms which enable them to attain their growth, and divides them into leaners, clingers, weavers, graspers, and rooters.

The author presents a list of some 50 "of the most beautiful flowering climbers in the world in the opinion of men and women who have seen them to best advantage." Certainly no one will object to the inclusion in this list such handsome genera as *Allamanda*, *Bougainvillea*, *Medinella*, *Mucuna*, *Passiflora*, *Petraea*, *Pyrostegia*, *Solandra*, *Thunbergia*, and *Wisteria*. Some readers may deplore the omission of *Bomarea* (that spectacular member of the Amaryllidaceae), *Lapageria* (the national flower of Chili) or *Thibaudia* (one of the few scandent members of the Ericaceae). However, all of these are described in the text and illustrated in color.

The main body of the work is devoted to describing some 2,000 species of vines and illustrating in color and half-tone nearly 600 of them. As in his *Flowering Trees* book, families are arranged in alphabetical sequence from Acanthaceae to Zygophyllaceae. The author treats many groups himself, but he has enlisted the cooperation of 50 specialists who have contributed material in their fields of competence.

In a final section the author discusses and describes a few of the thousands of vines that have been omitted from his treatment; these

include vines of excessive size, weedy species, climbers with ornamental foliage (but inconspicuous flowers), those which produce showy fruits (e.g., gourds), scandent ferns, climbing palms and aroids, parasitic vines, rampant grasses and other epiphytes. To some, it may seem that if Ed Menninger had omitted from the main body of his work such species as *Cornus canadensis*, *Arctostaphylos uva-ursi*, *Epigaea repens*, *Loiseleuria procumbens* and many others which are usually considered ground covers, he might have been able to include a larger number of true climbers.

The colored plates on the whole are superior to those in *Flowering Trees*. Just a few (e.g., *Tricyrtis* pl. 118) are not sharply focused and the blue of *Ceanothus* (pl. 176) is muddy, but this is a very difficult hue to capture on film. Of typographic errors there are remarkably few; one unfortunate slip is gatsura for katsura on page 219.

In summary, let it be emphasized that over the years vines have occupied the role of orphans among ornamental plants and have been accepted more or less by sufferance in books devoted to shrubs. Here, perhaps for the first time in modern horticultural literature, this highly important group of ligneous plants has been accorded its rightful place in the sun.

JOHN M. FOGG, JR.

The Oxford Book of Food Plants

S. G. Harrison, G. B. Masfield, and Michael Wallis. Oxford University Press, Ely House, London. W1. 1969. Illustrations by B. E. Nicholson, \$10.00. (Library)

This book describes 420 different plants used as human food and ordinarily found in commerce worldwide. Both temperate and tropic kinds and cultivars are described by adjacent texts and colored paintings. The plants are indexed by both common and botanical names. Text notes give particulars of origin, geographic distribution, botany, culinary, and any known nutritional value.

The illustrations emphasize the edible plant parts at relevant stages of maturity. An illustrated botanical glossary is included for the uninitiated reader. Although specific references are not given in the text, the book was authoritatively compiled with the acknowledged collaboration of numerous famous international botanical and horticultural institutions and experts.

The plants are arranged in groups according to the kinds of food they provide: cereals and legumes; sugar crops; oils; fruits and nuts; the many forms of vegetables; herbs, spices, and flavorings; fungi; and beverages. The book has something to excite the palate of any reader.

The book is, of course, British-oriented, a factor which is most obvious in the fruit sections where the American reader will recognize most fruit kinds but not the described cultivars. Nevertheless, the book is one that should be at the fingertips of all who have any interest whatever in plants as human food sources. It is elementary and comprehensive, entertaining and informative, vivid and accurate. It is the kind of graphic horticultural book rarely published in this country.

A. A. PIRINGER

Flowers in the Garden

Dorothy Jacob. Taplinger Press, 29 East 10th St., New York, N.Y. 10003. 1969. 239 pages. illustrated. \$4.95. (Library)

"There are writers who are constitutionally incapable of keeping strictly to the garden path. The result is the books (of which this is one) which wander from the rigid line of spring sowing and autumn reaping into the by-paths of personal reminiscences or reflection, or which loiter to ponder on public or private happenings."

These few sentences of Mrs. Jacob, the English author of *Flowers in the Garden*, describe the informal style of her latest book but fail to do justice to the amount of interesting material which is included. She describes in great detail the creation of her two extensive gardens in Cheshire. Many of her suggestions are of practical value but others speak of past days when gardeners worked on vast estates. Few gardens of suburban America will be likely to obtain pleasant effects from a path forty feet wide which gradually narrows to a mere ten feet. Neither is one likely to have a decorative garden gate which includes a ship's wheel from an Admiralty tug. Also, some of the plant material is likely to be unfamiliar to gardeners on this side of the Atlantic.

As the author emphasizes, her book is not a technical one, but "intimate causerie among friends, swapping years of our gardening prowess." Taken as such, it is a most enjoyable little volume for those older gardeners who have nostalgic memories of their own.

MAUDE G. BENZINGER

The Victorian Fern Craze

David E. Allen. Hutchinson and Co., Ltd. 178 Great Portland St., London W1. 1969. 83 pages. illustrated. (Library), \$3.50.

Do not be misled by the appearance of the word "fern" in the title of this book. Mr. Allen is a social historian and has written this slim volume to document the rise and fall of a fad. That the fad concerned ferns is totally incidental—he could probably have written with equal lack of enthusiasm about goldfish-swallowing or what-have-you.

I am not qualified to judge this book as social science, but as a fern addict I found it very disappointing. Mr. Allen seems to have tracked down every scrap of information that was written or spoken about ferns during the Victorian Era but he does not pass much of it along to us. Instead, he lists his sources so thoroughly that the book reads like an over-blown bibliography. Over and over we get title of book, author, publisher, biographical sketch of author and publisher, date of publication, price, number of copies printed, number of copies sold, date of reprint (if any), price, number of copies sold, what bookstores carried it, etc., etc. We are given like information about magazine articles and speeches. Here and there a few meagre quotations are thrown in to the effect that a lot of people were writing about, growing, buying, selling, and collecting ferns between 1830 and 1870. Who was head gardener to whom and who did and didn't invent the Wardian case are thoroughly discussed.

But there is very little direct information about ferns. I am aware that fern nomenclature, even yet, is still in a chaotic state but Mr. Allen could have made some attempt to tell us what species were being grown. There isn't even a picture. All 12 illustrations are of Wardian cases or bell jars with the squiggles inside barely recognizable as ferns. What tropical ferns were imported? What native ferns were the most popular? The most prestigious? What medium were they grown in? How were the dried fronds mounted? Did people trade back and forth? How fierce was one-up-man-ship? What could a fern "monstrosity" possibly look like?

These and other questions were raised in my mind as I read the book but they were not answered. It's a pity that a book about ferns was written by someone who so obviously does not give a fig for them.

MADLINE L. LOVETT

Nature As Designer

Bertel Bager. Van Nostrand Rienhold Co., 450 West 33 St., N.Y., N.Y. 10001. 1966, 176 pp., 200 photographs. \$12.50. (Library)

An unusual pictorial display of the functional and intriguing forms found in nature. Attractively illustrated, your eyes will be taught to see nature through grass, seed pods, lichens, mosses and other forms throughout the seasons. A brief but interesting text accompanies each black and white photograph.

For the gardener who is also interested in art, photography, and ceramics, it is a botanical art study rich in its source of design ideas.

F. C. GALLE

Camellia Cultivars of Japan

Takasi Tuyama. (*Nippon tsubaki shu* or, *Japanese Camellia collection*.) Heibonsha, Ltd., 4-4 Ban-cho, Chiyoda-ku, Tokyo, Japan. 1966. iv + 468 pages. Illustrated. \$22.00.

Camellias of Japan, Vols. I & II

Takasi Tuyama, Ed. (*Nippon no tsubaki*). Takeda Science Foundation, Osaka, Japan. 1968. Vol. I, viii + 320 pages, incl. appendix. Illustrated. Vol. II, viii pages. Illustrated. Distributed by Hirokawa Publishing Co., Inc., 27-14, 3-Chome, Hongo, Bunkyo-ku, Japan. \$50.00, including surface mail postage.

Here are three superbly prepared books of special interest to botanists, horticulturists, and camellia enthusiasts. In America camellias have surged into popularity only since World War II, but in Japan they have been developing for nearly 300 years. These books treat 420 Japanese cultivars, mainly of *Camellia japonica*, replete with their names, descriptions, and notes in English (also Japanese), but above all, with each cultivar superbly illustrated in color and monochrome. These are not just picture books, for the texts in English deal widely with these Japanese treasures, transcending the barriers of language and distance which have long deprived us of the highly refined art of understanding, developing, and cultivating camellias in the Japanese tradition.

The first book, published in 1966, consists of reproductions of paintings of flowering branches, by Yoshio Futakuchi, the first plant painter in Japan, with accompanying text wholly in Japanese, including description and detailed history of each cultivar in

Japan, by Professor Takasi Tuyama of Ochanomizu University in Tokyo. The story of *Camellia japonica*, pp. 419-465, elucidates the history of camellias in Japan in detail from about 920 A.D. to the present.

The second work, that of 1968, in two volumes, is mainly in English, but is not a detailed translation of the earlier book. The core of Volume One consists of descriptions in English of 420 cultivars, with notes on their origin and with the English meanings of their Japanese names. Following that are 44 plates, each showing a leaf of a cultivar in white on a black background, an aid to identification. There are 11 chapters by various authors carefully selected for their special skills, four chapters written by Professor Takasi Tuyama, the modestly self-designated "editor," who should more correctly be called the author. These chapters deal with the history of *Camellia japonica*, ecology of the wild species, the snow camellia, (sometimes as *C. rusticana*, sometimes as a variety of *C. japonica*); physiology, cytogenetics, taxonomy and nomenclature, origin and distribution, culture and propagation, and diseases and insect pests, each chapter with a special bibliography of pertinent works.

The crowning glory of these works, however, lies in Volume Two, which consists almost entirely of superb colored photos of flowers and leaves of all these camellias, 404 of them cultivars of *C. japonica*, the rest of *C. sasanqua*, *C. oleifera*, *C. reticulata*, and six other species of eastern Asia. These are arranged by color, i.e. white, light to dark pink, red, blotched, and striped, each with romanized Japanese name. Indexes are adequate for the user's needs, be he a westerner or a Japanese.

The information recorded here on the cultivars comes from the editor's many years of intimate knowledge of the living plants, and from critical study of the extensive literature in Japanese—the latter more thoroughly detailed in the 1966 treatment, all in Japanese. The appreciation and love of these plants has been expressed for centuries in poetry and other writings, some of which are reproduced in the Japanese portions of the first of this two-volume work. Would that such love for these Japanese treasures could be suffused into our own western culture. These books will help.

The author has modestly said that they are only the first step in making known, internationally, these Japanese cultivars. It is with the greatest pleasure that we anticipate the second step.

EGBERT H. WALKER

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