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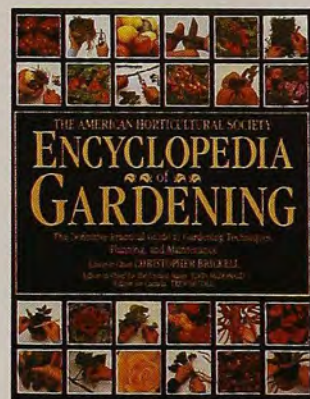
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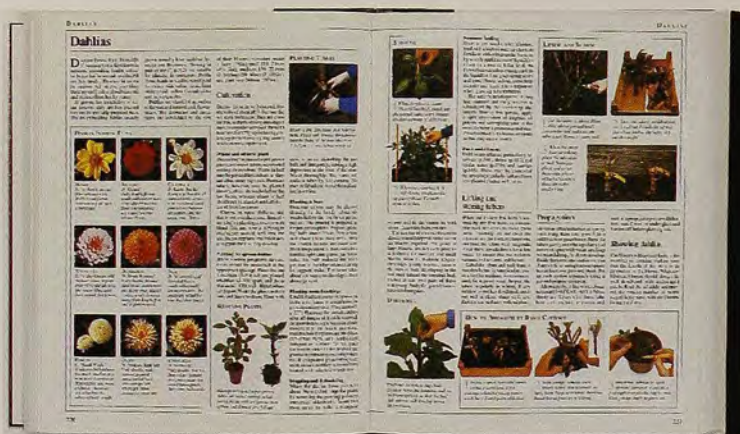
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Volume 72, Number 10

October 1993

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A retired surgeon discovers *Dracula* in the jungles of South America—along with some other little-known orchids.

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In winter, its silhouette seems to scratch the sky while its seed pods rattle in the wind.

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OCTOBER'S COVER

Photographed by Alec Pridgeon

Dracula tubeana is an orchid native to the forested slopes of northwest Ecuador. Retired surgeon Carlyle Luer gave the genus its name, which is from the Latin for "little dragon." Its species include other fanciful names, like *D. vampira*. Until Luer declared *Dracula* a separate genus in 1978, these orchids had been included among the *Masdevallia*, which are equally bizarre and beautiful. Learn more about the man and the orchids in "Stalking Dracula," which begins on page 16.

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COMMENTARY

I've had the privilege of serving as President and chairing the Board of Directors of the American Horticultural Society for the past three and a half years. Regrettably, I now have to move on to attend to personal affairs and to pursue my other interests in both horticultural and nonhorticultural fields.

At the time that I was elected your President, I set forward a series of programs that fall under the rubric of serving the existing membership and increasing the Society's influence in the world of horticulture. I provided leadership where I thought we needed it: strategic planning, organization, public relations, and development.

Back in early 1990, there was no plan. The organization was in transition. Few, if any, members of the horticultural community had a clear impression of us, and we were in deep financial waters. By and large, the Board and staff responded to the situation with energy and devotion. We are on course in our promotion of the value of plants and gardens. An excellent example is the ongoing program of providing resources to youth educators to enhance their ability to teach horticulture. Indeed, I'm pleased to tell you that the Society has achieved most of the goals I set out, and that we are now positioned to assume our role as the premier catalyst for horticultural awareness in this country. The mission of the Society—to acquire and disseminate horticultural information and knowledge—has been re-established, as has the general purpose of serving the greater public and future generations of gardeners and horticulturists.

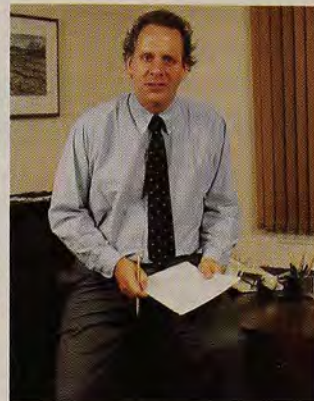
The French poet René Char wrote, "Poetry will rob me of my death." The same could be said of horticulture. Its life-affirming aspects will be emphasized in the years to come at the AHS, particularly for children and senior citizens. We will continue to focus on both the art and the science of plants and gardens.

This issue is a good example. In the spirit of Halloween, we take a close-up look at the mechanisms of carnivorous plants and talk to one gardener who is an expert at growing them. We take you to the jungles of New Guinea, where two plant hunters rediscovered the *impatiens* of the same name in 1970, and we note that it takes both hunters abroad and dedicated breeders back home to bring new plants to American gardeners. And we introduce you to a quintessential amateur horticulturist: Carlyle Luer, who retired from surgery to devote his time to documenting rare orchids from the Andes.

It has been an honor to serve you. To my new and old friends, I bid farewell for the present and thank you for your support. I look forward to seeing you at many future Society activities.

I hope that my successor to the title of AHS President, Dr. H. Marc Cathey, obtains the support and cooperation given to me. I wish him much success in this new role.

George C. Ball Jr., AHS President





LETTERS

Plant Patriot

The June articles by Joan Hockaday ("Colonial Collecting" and "From Aster to Vancouveria") and Rayford Reddell ("English Roses—Jolly Good?") have only reinforced my opinion that we need to breed American plants for American gardeners.

I have tried a dozen Austin English roses over the last ten years. Only one, 'Chianti', has flowered well (once a year with little fragrance), usually with good vigor, but in my garden it is often beset by leafworms. My conclusion from this experience should be tempered with the fact that the Austin English roses are a very diverse lot and I have not tried them *all*, but I figure that I have paid about \$90 for this one plant of 'Chianti' (all twelve roses times an average price of \$7.50). My found (*i.e.*, free) 'Shaliler's Provence', with good fragrance and vigor, far outshines 'Chianti' in my garden.

I should have expected that English roses were bred for English climates. After all, the magenta and white forms of our native *Phlox paniculata* do very well in my garden, but all the English hybrids of phlox get to around August in my garden (with an excess of 100 degrees and close to 100 percent relative humidity) and croak! On the other hand, the native perennials, from genera such as *Amsonia*, *Baptisia*, and *Monarda* do perfectly well and always reward my efforts with good bloom and few insect and disease problems. Bring on the Americans!

Arthur O. Tucker
Dover, Delaware

Celebrating Jekyll

I was thrilled with your beautiful cover illustration (June) showing the rose 'Gertrude Jekyll', as this year marks the 150th birthday anniversary of the great English gardener. Joan Hockaday's articles on the extent to which American plants are used in British gardens were particularly interesting and well illustrated. Miss Jekyll was a great admirer of American plants and she exchanged seeds with American visitors to her garden at Munstead Wood as well as with her correspondents. The garden

writer Mrs. Francis King (featured in "Mrs. Francis King: 'Dean of American Gardening,'" *American Horticulturist*, October 1991), whose own garden had Jekyll's famous 'Munstead Bunch' primroses, began her long correspondence with Jekyll by sending her seeds for delphiniums in an unusual blue shade.

Judith B. Tankard
Newton, Massachusetts

Tankard is co-author of *Gertrude Jekyll: A Vision of Garden and Wood*.

Natives Advisory

I enjoyed Joan Hockaday's two-part "American Roots in British Soil." A great place to see *Trillium grandiflorum* is on Interstate 81 between Syracuse and Watertown, New York. In early May there are large stretches where the ground is white with the trillium and yellow with *Caltha palustris*, the marsh marigold.

Two underappreciated American natives that our British friends might consider are *Caulophyllum thalictroides* (blue cohosh) and *Disporum lanuginosum* (fairy-bells). Neither has particularly showy flowers, but both form attractive shrublike clumps about two feet high with distinctive foliage—a rich, shiny green for the fairy-bells and a soft gray green for the blue cohosh. The bright orange-red berries on fairy-bells are spectacular, whereas the cohosh has large blue berries. Of particular interest with cohosh is the dark purple-black early growth. I commend both of them to Americans and British alike.

William A. Plummer
Painted Post, New York

Nostra Culpa, Sir Harold

I enjoyed immensely "The Moonlight Garden" by Peter Loewer (June) and look forward to reading the book from which it is adapted.

I have one small correction. The article states that Sissinghurst garden was created by Vita Sackville-West "and her husband, Nigel Nicolson." Vita Sackville-West's husband was Sir Harold Nicolson, the author, diplomat, and politician. He was responsible for the plans of the gardens at

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Sissinghurst—the “bones” of the garden—while Vita Sackville-West was responsible for most of the plantings. Because the flowers and shrubs have always tended to get the spotlight, he often does not get the credit he deserves for laying out the splendid garden plan, including the hedges with the *claire-voie* noted in the article.

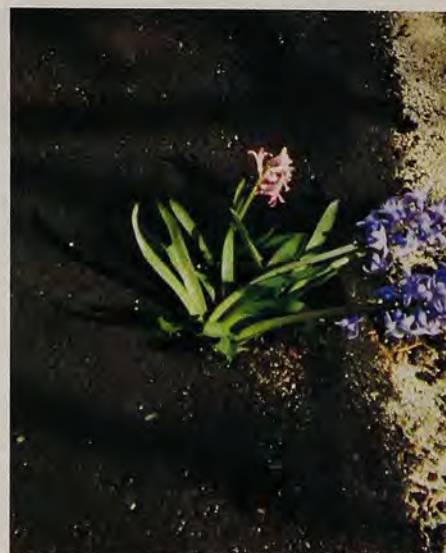
Nigel Nicolson, a publisher and author, is one of Harold Nicolson and Vita Sackville-West's sons. He still resides at Sissinghurst.

Barry Eigen
Ellicott City, Maryland

Peter Loewer replies: As they once said, “Boy, was my face red when they tasted my pie crust!” To say I’m embarrassed is putting it mildly. Of course, Nigel is the son and Harold is the father—and I should know because I interviewed Nigel about Sissinghurst back in 1979. Which only goes to show that short-term memory isn’t the only thing to go! My one solace is that two crackerjack editors, two excellent editorial assistants, one great proofreader, and a number of other readers and reviewers also missed this flagrant error.

Herculean Hyacinths

Last fall I had a small area repaved to my back door. This spring I noticed a small



crack and about two weeks later, look what came up! I know plants are strong but I couldn't believe what happened. Neither could my neighbors.

Mrs. P. Madden
Wenham, Massachusetts

This reminds us of the wheat straws that get driven through bricks by tornadoes. We'd love to hear from readers with other Powerful Plant stories. With photographic verification, of course!

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OFFSHOOTS



CYNDY PATRICK

The Chance Worth Taking

By Barbara Overton Christie

Last September, I pruned the rhododendrons next to our house. "Butchered" is a more appropriate word. I knew I was flying in the face of established practice; rhododendrons are supposed to be pruned, lightly, right after flowering in spring. But for a few springs, other jobs had taken precedence. Now these bushes lumbered up like great green elephants, poking through the front porch rails, peering in the first floor windows, nurturing green mildew on the siding.

There was nothing for it, then, but to decimate the overgrowth so the bottom of the outside wall could be cleaned and painted. After a day clipping and hauling away branches, I resigned myself to sick-looking foundation shrubs in the spring. But came May, and what did we have? Slimmer, shorter rhododendrons, seemingly not much the worse for their autumn ordeal, with a respectable show of new leaves and flowers.

Years ago when we moved into our house, there was, in proper New England

fashion, a venerable lilac at the corner of the front porch. We guessed that it had bloomed heavily that year, since it was full of dead blossoms. My trusted garden encyclopedia told me that faded lilac flowers should be removed to prevent seed formation, which would reduce the next year's flowering. But flimsy lilac branches don't exactly make a secure prop for a ladder. So how does one pick faded blooms from a fifteen-foot-high bush? Dangle from a helicopter, clippers in hand? The following year, the untended bush was again topped with flowers. I realized then that previous property owners had also failed to find a solution, yet the bush kept flowering. Indeed, if unpruned seedheads were a slippery slope to decline, we wouldn't see all those ancient lilacs that still grace long-deserted farmhouses.

Another spring, a neighbor dividing her big clumps of white and pale pink garden phlox gave me some divisions. "Just be careful to deadhead them," she warned. "If you don't, the self-seedlings will revert to magenta and crowd out the pretty pink and white." I promised to faithfully heed her injunction—and faithlessly forgot. There

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was plenty of self-seeding, all right, but among the unworthy magentas the next season were some delightful deeper pinks and rosy-eyed whites. And the original pure whites and pinks persist to this day.

A friend who was thinning out bearded irises one spring offered me some surplus rhizomes, but reminded me that irises are best planted in late summer or fall. I elected to take a chance. The rhizomes settled in and put on a flower show the following May.

Seed catalogs usually state that nasturtiums don't flower well in soil that is too rich, too moist, or without full sun. I love nasturtiums, but the area where I wanted them had been previously fertilized, received only early morning sun, and retained considerable moisture. I crossed my fingers and sowed a packet of seed. My yen was satisfied by a moderate amount of blossoms from mid-June until frost.

Then there is my Christmas cactus, well over fifty years old. The relative who handed it down to me always put it outside after the last frost each spring and forgot all about it until she brought it back in to a sunny window in October. Not wanting to disrupt this elderly *Schlumbergera* from its established routine, I followed the same carefree schedule, and it bloomed stalwartly for me every winter.

Later I read with dismay that one should feed and water a Christmas cactus regularly all summer, then put it in the dark for twelve to fourteen hours every night for six weeks before returning it to its wintertime window. That year, consumed with guilt, I treated my cactus with this rigid TLC. The poor thing that had managed to bloom every December during all those previous years of neglect continued to do so, with no great difference that I could see.

What is the moral of these anecdotes? I'm no stubborn nonconformist. I prefer to follow proven methods. I know expert advice is sincerely formulated to save the novice expense and disappointment. But many years' experience has shown that some rules of home horticulture can be bent. If one forgets, does not realize, or is simply unable for some reason to follow established practice, the results are not inevitably fatal. Most popular plants are fairly adaptable (in fact, that may be why they're popular).

A garden is supposed to be a source of pleasure and should contain an element of surprise. Too many rules can discourage even those of us with some experience. The way of the experts may be the best way, but it isn't necessarily the only way.

Barbara Overton Christie is a free-lance writer in Westbrook, Connecticut.

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BOOK REVIEWS

The New Houseplant

Elvin McDonald. Macmillan Publishing Company, New York, 1993. 270 pages. 9 1/4" x 10 1/4". Color photographs. Publisher's price: hardcover, \$40. AHS member price: \$36.

We've waited a long time for this book. For decades, we've been begging for a reference volume to tell us what, where, and how to grow plants indoors. At last that book has arrived. *The New Houseplant* heralds a new era of indoor gardening.

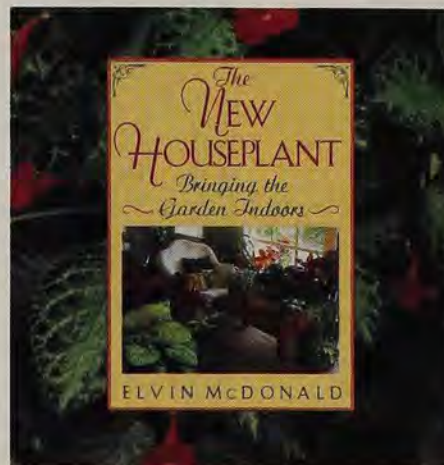
But as Elvin McDonald readily admits in his introduction, there's nothing new about house plants themselves. They have been around for centuries, and they were particularly big in the Victorian era. But they haven't always been on the cutting edge. Besides a few pitiful philodendrons in the sparse interiors of the 1960s, house plants have spent most of this century in absentia.

McDonald hopes to usher in a rebirth of windowsill gardening. His book is about consciousness-raising—about elevating our awareness and bolstering our courage. It's a compelling plea for house plants, the underdogs of horticulture.

I've always wondered why otherwise brave, gutsy gardeners are reduced to fear and trembling at the thought of tackling house plants. Even in Britain, a land overflowing with topnotch gardeners, scant attention is paid to house plants. Well, if the absence of indoor flora is due to the dearth of printed instructions on the subject, McDonald will come galloping to the rescue.

The New Houseplant is a mercifully complete volume. It speaks confidently of watering, repotting, fertilizing, positioning, propagating, pruning, sculpting, and debugging. My favorite line came in the section on watering—always a tricky topic. While pondering moisture meters, McDonald observed, "... hardly any tool can be as sensitive and accurate as well-informed fingers." I share his disdain for gizmos that perform services we can achieve better by hand.

Perhaps McDonald could have taken a more aggressive approach to pruning—I



see pruning as a beautification treatment rather than a corrective measure. Most house plants benefit from it early in their careers and throughout their lives. I also felt that fluorescent-light gardening was given too much space. I hope that "the new house plant" will come out of the closet and flourish in natural light.

After bolstering our confidence, McDonald delves into a detailed list of windowsill plants. He edges his readers gently into the subject with a chapter on seasonal stand-bys—the cinerarias, azaleas, chrysanthemums, and amaryllis that we all see and succumb to in the supermarket. Each entry is so complete that even a rank novice can scarcely go astray. Then he tackles rarer plants. The possibilities are vast, but he keeps things manageable by grouping plants by family. By flipping through these pages, anyone can see that there's much more to house plants than weeping figs and philodendrons.

The plants are introduced and the knowledge is at your fingertips. There's nothing left to do but dig in (McDonald counsels us to don gloves, but I do it bare-handed). *The New Houseplant* is bound to rally converts.

—Tovah Martin

Tovah Martin is a writer and senior horticulturist at Logee's Greenhouses in Danielson, Connecticut. Her most recent book is *The Essence of Paradise*.

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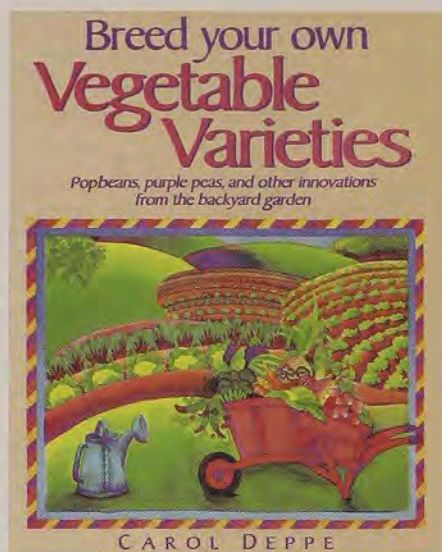
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Breed Your Own Vegetable Varieties

Carol Deppe. Little, Brown and Company, Boston, 1993. 303 pages. 7½" x 9¼". Color photographs and black-and-white illustrations. Publisher's price: softcover, \$18.95. AHS member price: \$17.

This book is an important addition to the literature on increasing the biodiversity of the useful plants. Carol Deppe begins by explaining clearly why mass-produced seeds often yield disappointing results for the small-scale vegetable grower. Seeds developed in the sandy soils of Idaho may not be the best choice for the heavy clay of the Southeast. Because of such variations in climate and soil, Deppe says, "Every gardener should be a plant breeder."

From the opening lines of the introduction, I was hooked. For those who've been told "you can't grow that here," this book unlocks a world of possibilities. Deppe addresses readers with a broad range of expertise. From those just harvesting their first crop to serious breeders—everyone will find useful material here. Amateurs who have managed successful breeding programs in their back yards are cited as role models for all of us who would like to grow "bigger, better, tastier, earlier, more



productive . . . vegetables." Each chapter builds readers' knowledge of techniques for "fine tuning" vegetable varieties.

Deppe, a Harvard-trained geneticist and plant breeder, is to be congratulated for her easy-to-understand chapters on germplasm and genetics. She has a knack not just for explaining complicated genetic principles, but for actually making them interesting. And readers who really want to get into the nuts and bolts of breeding

will appreciate the appendices. Appendix A lists the chromosome counts, breeding characteristics, and references for "801 Interesting Plants"—a great asset for the really serious grower. Appendix B gives specific instructions for breeding some common vegetables. Other appendices list seed sources, including the U.S. Department of Agriculture's germplasm collections, and give advice on various breeding procedures. The result is a wealth of information that will allow all gardeners to transform mass-produced seed into site-specific varieties that will do well in their own soil, climate, and growing season. Deppe also provides a glossary, where she explains technical terms thoroughly, in language all of us can understand. You'll even learn what a popbean is and how it was developed.

Now that I know how to breed my own vegetables, I can't wait for spring. I'm going to plant some sweet-tasting, bush variety, 'Cave-Dweller' limas, and as soon as they start blooming, I'm going to soup them up.

—Keith Crotz

Keith Crotz is owner of American Botanist Booksellers in Chillicothe, Illinois, and a member of the American Horticulturist Editorial Advisory Board.



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The Gardener's Guide to Plant Conservation

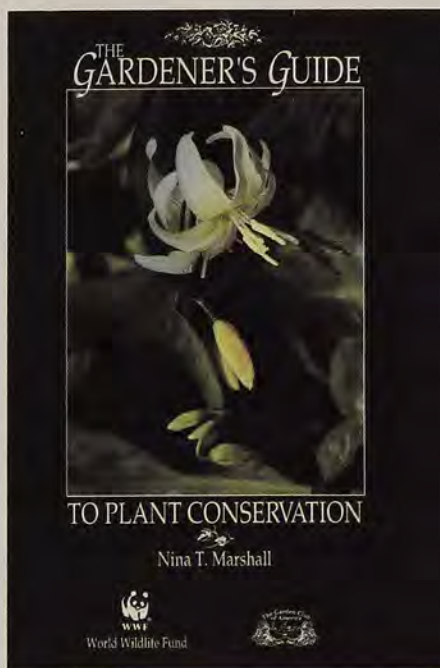
Nina T. Marshall. *World Wildlife Fund*, Washington, D.C., 1993. 187 pages. 6" x 9". Color photographs and black-and-white illustrations. Publisher's price: softcover, \$12.95. AHS member price: \$11.65.

In *The Gardener's Guide to Plant Conservation*, Nina T. Marshall addresses an issue not always in the forefront of public awareness. Few gardeners, whether hobbyists or professionals, realize how many of our common garden plants are collected from the wild—often so intensively that many wild populations become endangered. In recent years, plant enthusiasts have found increasingly frequent references to the importance of avoiding wild-collected plants, but there's usually little specific information on how they can directly address this issue. This book is designed to help American gardeners make environmentally sound choices when they buy their plants. In my view, Marshall accomplishes her goal very effectively.

The problem is complicated by many factors, not the least of which is that people in poor regions may depend on plant collection to provide the basic necessities of life. But how can the consumer avoid contributing to the problem? Marshall lists a number of valuable tips for identifying wild-collected plants and suspect sources. She recommends maintaining a healthy skepticism of the phrase "nursery grown." In Turkey, for instance, undersized wild-collected bulbs are often temporarily transplanted into nurseries and later exported as propagated plants. Consumers, she writes, should look for labeling that clearly provides information about source. Cheap prices are often affixed to wild-collected material, but Marshall says we should avoid temptation.

Marshall encourages gardeners to grow plants from seed. A section on information sources will prove helpful in locating both seeds and real nursery-propagated plants. She also urges environmentally conscious gardeners to voice their concerns to vendors. The power of the consumer, she thinks, could be a major force for reform.

Marshall notes that the common rationalization for growing wild-collected material—the idea that wild populations can be maintained within the confines of a garden—is not valid. Such populations are isolated from wild gene pools and may die out under unsuitable conditions. As today's floral gene pool is diminished, so too will be the options available to future plant breeders.



Plant enthusiasts with a passion for a delicate species tulip, a terrestrial orchid, or some desirable native may have to accept the fact that their most coveted plant is unlikely to be propagated. Trade in wild plants will continue as long as consumers remain unaware of the consequences of their actions. Marshall's book is an important step toward bringing those consequences to the attention of the gardening public.

—Chip Tynan

Chip Tynan is a garden columnist for the *St. Louis Post Dispatch* and an advisor at the *Missouri Botanical Garden's Horticultural Answering Service*.

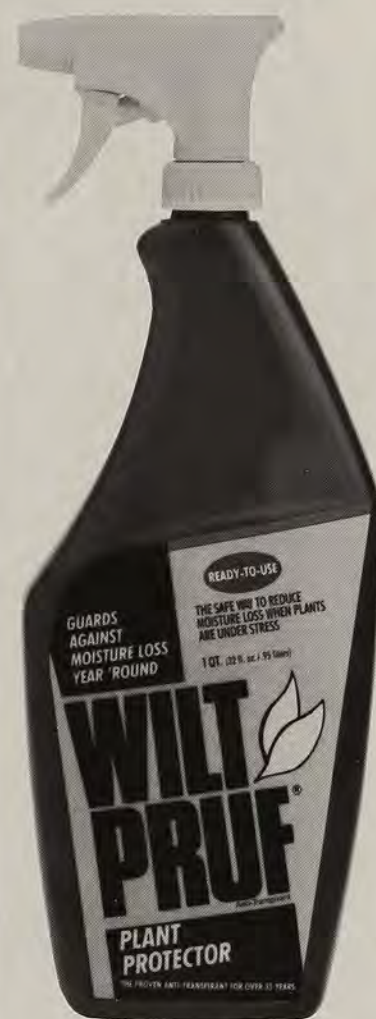
The American Mixed Border

Ann Lovejoy. *Macmillan Publishing Company*, New York, 1993. 240 pages. 9" x 11". Color photographs. Publisher's price: hardcover, \$35. AHS member price: \$31.50.

"A writer needs a pretty good reason to introduce yet another garden book into today's crowded market," declares Ann Lovejoy in her introduction to *The American Mixed Border*. But she correctly sees a need for books about garden making, the process of turning an assortment of plants into a coherent garden, and her new book goes a long way toward filling the gap.

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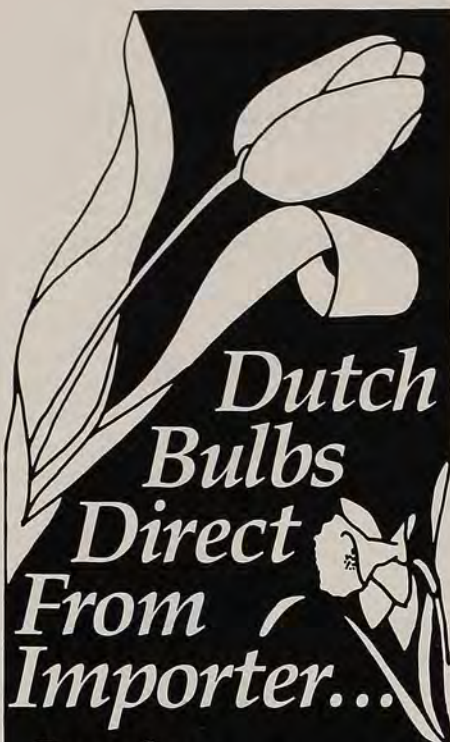
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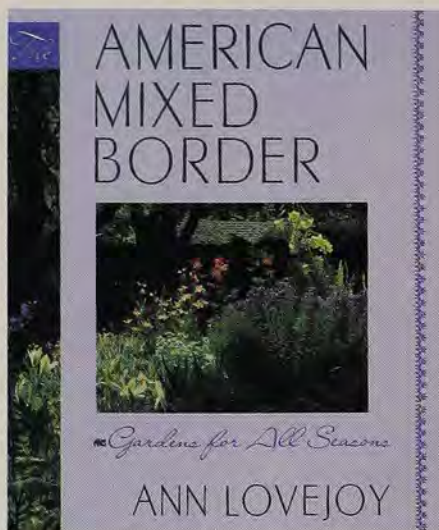
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mental grasses and low-maintenance perennials. Now we are seeking native plants and wildflowers that thrive naturally in our garden conditions. We are at last beginning to establish an American vernacular, a style of gardening that is truly our own, and *The American Mixed Border* represents another guidepost along the path to garden autonomy.

Lovejoy has taken the traditional concept of the mixed border of small trees, shrubs, herbaceous flowers, and ground covers, and translated it into distinctly American terms. The naturalistic style of the mixed border is, she says, appropriate to our informal lifestyles. Its diversity of forms allows us to appreciate individual plants more readily than is possible when plants of similar type are packed into a grand formal border.

Lovejoy is serious about her gardening, and her book is a serious tool. It will probably intimidate raw beginners, but it contains a wealth of information and plenty of inspiration for gardeners with some experience under their belts. This is no coffee table book. Although handsomely illustrated with color photographs, many of them showing the author's own garden, its pages are dense with information.

Lovejoy considers garden making an art form. To master it, she argues that we must train our eyes as painters do, to discern proportions and to see the relationships between form and space, color and light that give garden design its grace.

But she is also sensitive to the limitations of time, space, and money that most of us face, and to the demands of family and lifestyle. She reminds us that her own gardens coexist with kids and pets.

Lovejoy likes her plants to assume their natural forms, and she wants to see gardens framed and enclosed by hedges and fences appropriate to region and site. Her

philosophy, which I heartily endorse, is one of living lightly off the land. She argues that gardeners should improve the soil, preserve old plant varieties, avoid toxic pesticides and chemical fertilizers, and try not to waste water. Surely we should all strive to reach these goals.

Lovejoy explains how to design a mixed border, and analyzes some of the great mixed gardens of England and the United States. A lengthy chapter discusses the nuts and bolts of creating the garden—soil building, mulches, fertilizers, moisture, light, and maintenance. There is even a seasonal guide to garden care. Subsequent chapters examine the roles of trees, shrubs, perennials, annuals and biennials, vines and climbers, bulbs, ornamental grasses, and ground covers. Lovejoy also describes some of the best representatives of each group. Throughout, the text is insightful, richly informative, and straightforward in its presentation. Once again, Lovejoy has earned her reputation as one of our foremost garden writers.

"No matter where we live," she writes, "we can grow a gardenful of something wonderful without harming the environment or wasting resources." This valuable book points the way. —Anne Halpin

Anne Halpin is a writer, editor, and professional gardener. Her most recent book is Great Gardens From Everyday Plants.

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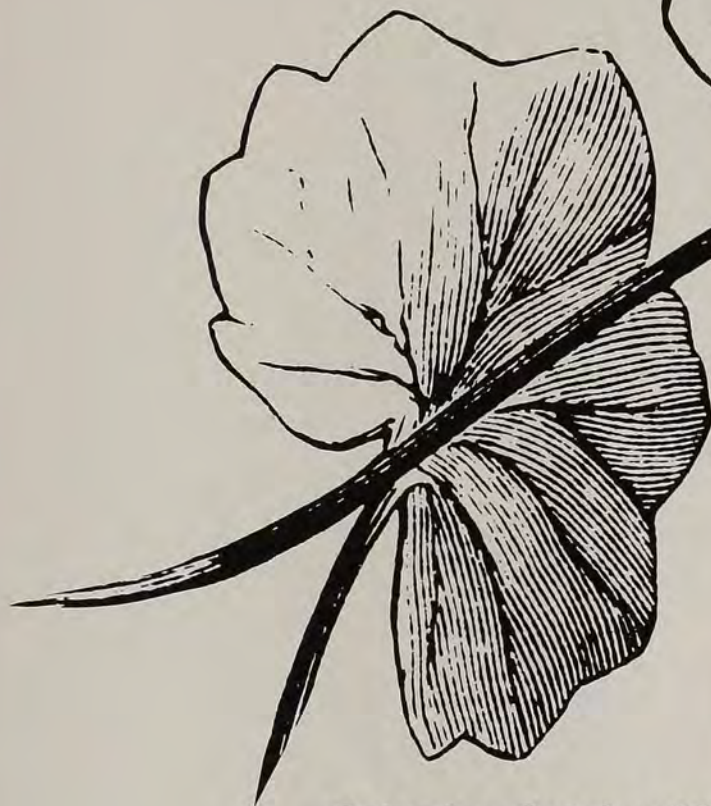
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Stalking Dracula

For twenty years, retired surgeon Carlyle Luer has been documenting this genus and other eerily beautiful orchids.

BY CHRIS BRIGHT AND CHANTAL PARÉ

Orchid growing isn't usually a dangerous hobby. But finding those celebrated flowers can be an exercise in rock slides, disease, and mayhem. Nobody knows this better than veteran orchid hunter Carlyle Luer, who has had to learn some survival lessons that you can't get out of any field guide. "Once in 1985 we ran into a guerilla ambush," Luer recalls. "We had been collecting all day, thirty or forty miles from the nearest village, in the eastern Cordillera region of Colombia, where the guerillas were operating. At dusk, we were driving into town when we found a log pushed across the road. We started to push it out of the way, before our driver realized it was a road block. He was frantic—motioning for us to get back in the car. He was really shaking." Not a shot was fired, but they drove in the opposite direction until they reached a town at about one in the morning. Luer still isn't sure what saved them. "Maybe they were off having dinner," he says. "Or maybe they were waiting for somebody else."

Such moments are a fact of life for this 71-year-old retired surgeon who has spent the last two decades pursuing orchids in the wilds of South and Central America. Luer's efforts have won him wide renown among orchid cognoscenti. "In the fifteen years that I have known Carl Luer, I have never met a person . . . more driven and singularly focused on the task before him or her," says Alec Pridgeon, a senior researcher at England's Kew Gardens and formerly the director of education and research for the American Orchid Society. The task Luer has set himself is a mammoth piece of taxonomy: the scientific description of the Pleurothallidinae, one of the largest and most complex groups in the orchid family.

A native of Illinois, Luer arrived in Sarasota, Florida, twenty-five years ago. In 1976, he retired from his general surgery practice of over thirty years. But long before he left his first career, he was hard at work on his second. "I saw orchids growing wild here in Florida," he says. "Of course at the time I didn't realize they were also growing wild in Illinois. I got interested in them and tried growing them." He also tried studying them and in 1972, he published *Native Orchids of Florida*, followed three years later by *Native Orchids of the United States and Canada (Excluding Florida)*. "Both are still the most consulted floras on the subject," says Pridgeon.

If Luer excelled at orchid scholarship, he also proved adept at orchid politics. In 1973, he was instrumental in organizing Sarasota's Selby Gardens from the estate of Marie



PHOTOS BY ALEC PRIDGEON

Above: Carlyle Luer, his wife Jane (left), and Marguerite Webb of J&L Orchids in Easton, Connecticut, examine plants collected in the Colombian Andes before pressing them for herbarium specimens. Opposite: Masdevallia pinocchio is rare in its native habitat on the eastern slopes of the central Ecuadorian Andes.





ALEC PRIDGEON

Zootrophion dayanum is native to the Andes of Venezuela, Colombia, and Ecuador.

Selby, the widow of an oil tycoon. In her will, Selby had asked that her property be maintained as a public park. Luer happened to be on the board of the bank that administered the will. He convinced the board's skeptical chairman that the best way to satisfy Selby's request would be to turn the property into a botanical garden. Today the Marie Selby Botanical Gardens is a major center for the study of orchids and other epiphytes—plants that grow on other plants without parasitizing them.

But it was only after he left the operating room that Luer became an orchid hunter. "I had a lot of energy left after I retired," he says. "And I was casting about for something to do." Cal Dodson, at the time Selby's director, suggested that a group of orchids known as the pleurothallids might repay his attention. "They're small," Luer says, "not particularly attractive for the most part, but numerous." To Luer, they

proved irresistible—a *flora incognita* just waiting to be explored.

The term "pleurothallid" derives from the Greek words for rib and branch, an allusion to the tufts of riblike stems typical of many species in the Pleurothallidinae, one of dozens of subtribes within Orchidaceae, the orchid family. Because Orchidaceae is such a complex family, taxonomists have had to create legions of subfamilies, tribes, subtribes, and genera in order to accommodate the extraordinary variety of species. With over 30,000 recognized species, Orchidaceae is also one of the largest plant families, rivaled only by Asteraceae (or Compositae), the sunflower family, and Poaceae (or Graminae), the grass family. Native to every continent except Antarctica, the orchid family has a range to match its size. Most orchids, however, come from the New World tropics, or neotropics. A curious feature of this far-flung family is its rather narrow habitat preference: fully 70 percent of all orchid species are epiphytes.

Pleurothallidinae includes about 3,000 neotropical species, or roughly 10 percent of all orchids. Most pleurothallids are epiphytic and despite Luer's disclaimer, many are spectacular. Their flowers range from the dramatic, forbidding splendors of *Dracula* to the tiny, inconspicuous blooms of *Dryadella*—both genera that Luer defined. Some pleurothallids are so small they could almost be mistaken for moss, while others grow to several feet. In many areas of the neotropics, they are ubiquitous: dozens of species may occur on a single tree trunk.

Luer's pursuit of the pleurothallids has taken him throughout Central America and the Andean region of South America. His wife, Jane, accompanies him on these expeditions. She has acquired her husband's interest—and a formidable degree of expertise in her own right. Since the mid-1970s, the Luers have taken up to four trips a year, each lasting from three to six weeks. All told, that makes some fifty expeditions. Luer pays for the trips himself—looking for funding is "just too much red tape." But botany is clearly profiting at his expense: thus far Luer has published scientific descriptions of several new genera and nearly 1,000 new species. "He's finding out that there are a lot more kinds of orchids in certain groups than people had thought," says Marshall Crosby, senior botanist at the Missouri Botanical Garden in St. Louis, where Luer is a research associate. "He's establishing a baseline of what we know

about these things." Luer shows no signs of slowing down and he's not worried about running out of pleurothallids either. "There's just such a wealth of stuff," he says. "You can't exhaust it."

In the field, Luer works from two points of reference: old friends and new roads. Latin American orchid specialists let him know of promising areas recently opened up by road construction, and invite him down for a look. Some of Luer's contacts have gone exploring with him for years. They're not usually after pleurothallids themselves, but they know Luer's interests well. "Often," he says, "my friends will have anywhere from ten to 100 specimens waiting for me when I arrive."

The Luers and their hosts usually do their exploring in four-wheel drive vehicles, checking the cut trees along the roadside, stopping whenever someone sees something. Often this is Jane, who is reputed to have an eagle eye for spotting the plants—even from a moving vehicle. Younger members of the party occasionally disappear into the forest, to return with extraordinary prizes. But Luer usually confines himself to the road cut. "I don't do too much physical exertion," he says. "I didn't start this until my life was on the decline." That's not as great a constraint as it might seem: to a trained eye, the cut itself offers a rich sample of the local biota. "On a single new road," says Luer, "you might find half a dozen new species."

Finding the orchids is easy compared to the work that comes next. Once a plant is retrieved, it must be described and preserved. Luer records the orchid's location, its companion plants, and the elevation of the site. Flowers and foliage are collected for pressing. More flowers are cut and dropped into vials of pickling fluid—a mixture of formalin, alcohol, and glycerin. Vial labels are coded to the field notes, and flower color is carefully noted, since the pickling fluid may affect it. Later, Luer will create botanical drawings based on the pickled flowers.

There are problems besides the insects, the rain, and the heat. Pickling vials are always in short supply, so specimens must be doubled up. To avoid confusion, Luer tries to make sure bottle-mates don't belong to the same genus. And sometimes a flower is too big to fit into a vial, so it must be packed carefully for drawing that very evening.

Drawing is the heart of Luer's work. Despite the prevalence of cameras, taxonomy is still highly dependent on the art of

botanical illustration. "Photos can't show you what you need to see," Luer says simply. Because photos don't show measurements and significant proportions, their primary value for taxonomists is to help produce drawings.

Luer came by his artistry on his own. "I never had a lesson," he says. "The only drawing I had was in anatomy and bacteriology." Since some of his flowers are only a millimeter or two long, his usual technique is to float them in water, then peer at them through a microscope. Most of his drawing is done at home. "You don't have time to draw in the field," he says, but Pridgeon has seen him make the time. Recalling a 1983 trip to Colombia with the Luers, Pridgeon says, "both of them would

Dracula chimaera of western Colombia was discovered by Benedict Roezl of Prague in 1871 and was the first of its genus to be named. It has some of the largest flowers of the genus, up to 30 centimeters from its top to bottom tails.



ALEC PRIDGEON

Below left: Luer persuaded the Missouri Botanical Garden and England's Kew Gardens to collaborate on producing *Thesaurus Woolwardiae*, containing sixty watercolors by nineteenth-century artist Florence Woolward. Seen here is *Epidendrum vitellinum* 'Majus'. Luer, a self-taught botanical artist, illustrates his own monographs. Center: *Pleurothallis vorator* of Bolivia (the species name is from the Latin for "devourer") is yellow-orange. Right: The hairy, dark purple *Myoxanthus stonei* of Costa Rica is known only from its original collection in 1978.

collect and press plants by day, and at night, when most workers would collapse exhausted or tip a *cerveza*, Carl would unpack his microscope and sketch fresh flowers to be inked when he returned home."

Life on the road can be rough—sleeping in seedy hotels, eating fried eggs and rice for weeks on end, enduring parasites and disease. Luer says he's picked up some parasites, "but so far, we've avoided malaria." And then there are the really heart-stopping moments. "We've had some brushes with landslides. We once had to drive over a rock slide that was active," Luer says, recalling a nasty stretch of road in Bolivia. "Rocks one or two feet in diameter were bouncing down the hill. If one of them had hit the car, it would have crushed it."

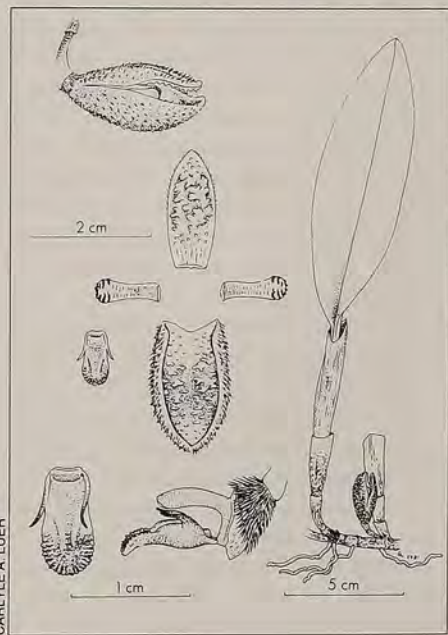
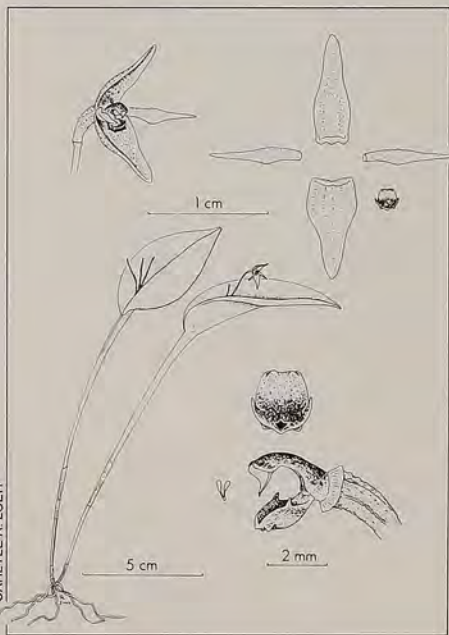
Under such circumstances a sense of humor can be a valuable asset. Luer's is devilish, according to Pridgeon, and it extends to practical jokes. "During that trip to Colombia," Pridgeon says, "we were based in the mountains above Medellín in a farmhouse, which, as we learned at nightfall, we were sharing with bats. 'Are they making a scratching noise like this?' Carl asked, scraping the dimly lit table with his fingernails. 'Oh, yes, right,' we replied, 'that's the sound.' 'They're vampire bats then,' he observed casually but convincingly. No one but Carl slept well those nights as the harmless little fruit bats flew in circles above our heads."

The jungle is where Luer finds the orchids, but his quiet Sarasota study is where he makes most of his discoveries. His prin-

cipal reference tool is his collection of pickled flowers. He now has 10,000 of these, each in its own little vial, each labeled and stored in a drawer. The collection is supplemented by a bank of thousands of his own drawings and a computer database for recording his findings. Despite the computer, the arrangement is in a "sort of nineteenth century mode," says Crosby, who has visited Luer's house. "People then often did research in their houses—Darwin worked mostly out of his house." Paradoxically, it's the computer, with its ability to process gargantuan helpings of data, that allows Luer to preserve this manner of an earlier era. It also helps, says Crosby, that the scientific literature on pleurothallids is relatively small—as are many of the plants themselves. "If he were studying cycads it would be another matter."

Luer's discoveries aren't instantaneous. The data emerge gradually, through the exacting process of drawing. Only then will he know whether a mysterious flower is a new species—or only a forgotten acquaintance. "Sometimes I'll spend hours drawing a plant and I know I've seen it before but I just can't find it—and then suddenly I realize what it is." But the effort is never wasted, Luer says, because it's important to record the variation within species, as well as between them.

Drawing plants that have already been described can lead to discoveries of another sort. In the late 1970s, Luer was working on plants that had been placed in *Masdevallia*, one of the larger pleurothallid genera. "From my drawing it became ob-



vious to me that there were other genera buried in there,” he says. He uncovered two of them, *Dracula* and *Dryadella*, and pulled a cluster of species out of *Masdevallia* for each.

Dracula now contains about ninety species of medium-sized epiphytes. Their flowers are usually large and fantastic—some might say bizarre. The three sepals terminate in long “tails” that look vaguely menacing. Red and dark purple are the dominant colors, often in striking patterns on a white background. *Dryadella* (a diminutive of the Greek word for wood nymph) consists of about forty small, thick-leaved epiphytes with inconspicuous flowers, usually in green and purple.

Luer is aiming for a thorough redefinition of the pleurothallids’ tortured taxonomy. In 1986, for example, he reclassified the immense genus *Pleurothallis*, one of the largest in the orchid family. His analysis divides it into twenty-seven subgenera, twenty-five sections, and over 1,000 species.

Crosby cautions that some of Luer’s categories may not withstand the test of time. “Some of his species are probably no good,” he says. “That’s not a criticism of him, but that’s how taxonomy proceeds. In fifty years somebody may come along and re-evaluate some of these things.”

But Luer’s work is more than just a starting point for his scientific successors. His huge output reaches several audiences—and serves several purposes. Much of his technical work, which he himself illustrates, is meant only for other taxonomists. But the beautifully illustrated serialized monographs, produced in collaboration with other scientists and artists, reach beyond pure science. The paintings in the *Thesaurus Masdevalliarum* and the *Thesaurus Dracularum*, for instance, should be seen by everyone who admires botanical art. Crosby says that such efforts have helped to popularize the scientific study of orchids and he cites another of Luer’s accomplishments in the genre. “He was the one who got Missouri and Kew hooked up for the *Thesaurus Woolwardiae*,” a reproduction of sixty orchid watercolors by the nineteenth century artist Florence Woolward. Recently rediscovered in a castle in Scotland, the paintings have never before been published.

Orchid growers, of course, constitute another of Luer’s audiences, as readers of the *American Orchid Society Bulletin* will know. Pridgeon, who for many years edited the bulletin, says that on account of his

writing, Luer has been named “Honorary Guru” of the Pleurothallid Alliance, an international organization of devotees to those orchids.

Luer’s work will grow ever more valuable as more and more of the neotropical forests are felled, burned, and bulldozed. A sense of loss colors even his most exciting discoveries since, as he says, “it’s destruction, in the form of roads, that permits us to go there in the first place.” But does Luer’s work help counter that destruction? “I wish I could say yes, but all my work does is record what’s here today. Maybe in one hundred years time there’ll be a desert where there’s a wet forest now. But people will be able to look back and say, this was here.”

Chris Bright is assistant editor of American Horticulturist. Chantal Paré is a free-lance writer from Beaconsfield, Quebec.

SOURCES

Hillview Gardens, 22714 S.E. Borges Road, Gresham, OR 97080, (503) 829-9808 or 658-5296. Catalog free. *Masdevallia* and *Dracula* species and hybrids.

J&L Orchids, 20 Sherwood Road, Easton, CT 06612, (203) 261-3772. Catalog \$1. *Masdevallia*, *Dracula*, *Pleurothallis*, and many other pleurothallids.

Species West, 25825 104th Avenue S.E. Kent, WA 98031, (206) 854-4082. Price list free with SASE. *Masdevallia*, *Dracula*, *Lepanthes*, and some other pleurothallids.



Masdevallia triangularis is found most often in the mountains of coastal Venezuela.

Fatal Attraction

When an insect succumbs to the charms of a carnivorous plant, it's not sinful, but it is deadly.

B Y P H Y L L I S Z A U N E R

The unsuspecting fly buzzes, circles, and makes what is destined to be its final landing, on an odd-shaped, twin-lobed leaf. It will walk the dangerous terrain for only a few moments before triggering hairlike projections. Then the Venus's-flytrap will snuff out its life with a device more lethal than anything wielded by a villain in a James Bond movie.

Attracted by the smell of nectar, a honeybee lights at the glistening mouth of an upright, tubular leaf and begins to feast. One false step later the hapless bee tumbles like Alice-in-Wonderland down the dark throat of the pitcher plant. What follows could hardly be described as a tea party.

Meet the meat eaters of the plant world. Mysterious and intriguing, they have acquired, in the course of evolution, the remarkable ability to attract, capture, and digest living animal prey. They are the Venus's-flytraps, pitcher plants, sundews, and bladderworts, dressed to kill in communion white, buttery yellow, pouty pink, and seductive red. As if all of these come-hither hues weren't enough, nearly all species are pungently scented.

Early botanists realized that certain plants attracted insects, but didn't realize they were digesting them. In 1760 Governor Arthur Dobbs of North Carolina first

applied the term "carnivorous" to what would later be called the Venus's-flytrap, *Dionaea muscipula*. Charles Darwin called the flytrap, so well outfitted for survival, the "most extraordinary plant in the world," and experimented with it and other carnivorous plants. He published the results of his research in *Insectivorous Plants* (1875), even today a standard reference.

The Venus's-flytrap, native to swampy areas of North and South Carolina, is a mechanical marvel. A small plant with a poor root system, its leaves will be bright red in sunshine, green in shade.

At the end of each leaf are two hinged lobes with a fringe of teeth along the edges. Insects are lured by the sweet scent of nectar. Inside the trap are tiny trigger hairs, three on each side. Here's where the plant determines the edibility of what has landed. If only one hair is hit, nothing happens—it could be a leaf or a twig. But if one hair is hit twice within twenty seconds, or two hairs are touched simultaneously, the plant perceives a movable object, probably tasty. The concave outer side of the leaf instantly puffs up. The trap snaps shut, but it still hasn't clamped tight. If the prey is insignificant, it can escape. But if it struggles, further irritating the trigger hairs, the leaf will close as tight as an envelope and release digestive enzymes. When it unfurls as long

as one to two weeks later, only the hard, chitinous exoskeleton of the unfortunate visitor will remain.

Although the nutrients have been removed, sometimes the exoskeleton of a fly remains intact and rewards the plant with a second meal. It may give a passing spider the notion that it's dinner time. Approaching the corpse, he quickly learns that it's dinner time all right, but that he's the entrée.

Seventeen genera of carnivorous plants grow around the world, from the Arctic Circle to the southernmost tropics. Generally they inhabit wet areas—bogs, seasonal wetlands, and mossy forests. They're believed to have evolved carnivorous adaptations to compensate for the dearth of essential mineral salts in the acidic soils in which they live. Carnivorous plants pho-

PHOTOS BY LES SAUCIER; PHOTONATS



tosynthesize, grow, flower, and otherwise behave like other green plants. They're different primarily in their ability to absorb nutrients from captured prey.

Among the carnivorous plants with traps that can move are the sundews—the *Drosera* species—given their common name because of the way the droplets of their secretions sparkle in the sun. There are five native American species; most of the nearly 100 varieties are found in the southern hemisphere. Their secretions, which coat the stalky glands that line the sundew's leaf, include a powerful adhesive. Each tentacle-shaped leaf may have 130 to 250 sticky glands. When insects are caught in the glue, the leaf curls around the prey and secretes digestive juices that break down their softer parts, absorbing the resulting nutrient-rich solution.



Left: Looking something like a wicked dental instrument, a Venus's-flytrap waits patiently for its next dinner guest. Above: In this instance it was a showy seepage dancer that paused a moment to rest its weary wings and was promptly invited to lunch.

Sundews feed primarily on flies or butterflies. Charles Darwin tried feeding a sundew sand and glass, but the plant wouldn't grasp them. When he offered it beef, the leaf edges curled in, the meal was digested, and the leaves reopened.

Clearly, the sundews have a preference for protein. Merilee Maertz, co-owner of a Sonoma County nursery, California Carnivores, says their sundews have accepted eggs, cheese, and even human hair. "But we don't do that often, because we think it's not good for them." Signs in their greenhouse caution visitors: "Don't tease the plants."

Another sticky plant is the Portuguese sundew, or dewy pine (*Drosophyllum lusitanicum*), a shrub that grows up to five feet tall on the dry coastal hillsides of Portugal, Spain, and Morocco. Its trapping and digestive mechanisms are much like other members of the sundew family. The linear leaves have many glands that secrete a mucilage with the wonderful aroma of honey. Attracted by the scent, mosquitoes, midges, and small flies light on the leaves, suffocate as they become mired in the mucilage, then are leached of nutrients by digestive enzymes.

Even more enticingly dangerous are the pitcher plants—the *Sarracenia* species. Except for the purple pitcher plant, *S. purpurea*, which is found as far north as Canada, they are natives of the southeastern United States. Pitcher plants can grow to three feet or more and produce showy

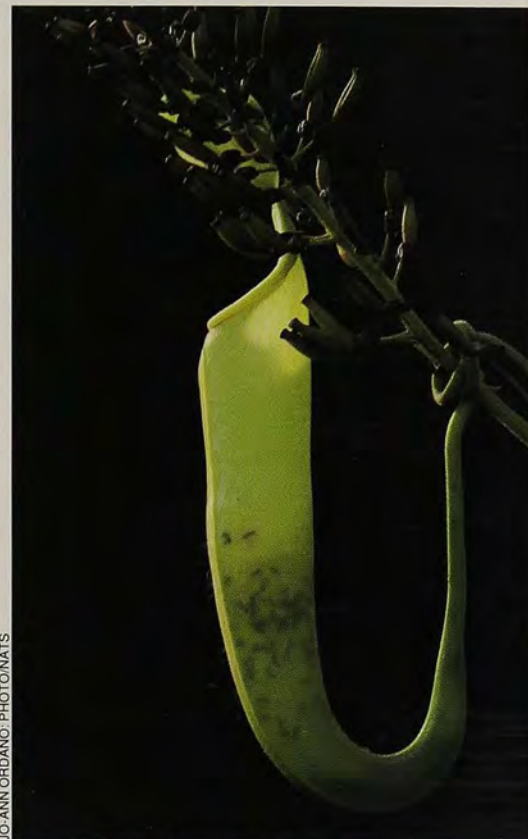
trumpetlike "pitchers" (actually modified leaves), open at the top and surmounted by a flaring hood.

Here is a bug's worst nightmare. An insect, attracted by the irresistible scent of the plant's nectar, begins exploring the lip, or nectar roll, and soon finds itself plunging downward, any hope of retreat cut off by many backward-pointing hairs. Nectar forgotten, the bug tries to escape, but it can't make a path against the pointed field. Weary from the struggle, it now encounters a smooth, hairless region where there is no footing at all. The end is near. It falls into the bottom of the trap, where it ends up being digested by enzymes and bacteria.

Another member of the Sarraceniaceae, the California pitcher plant (*Darlingtonia californica*), dispatches its prey in a similar manner. Also called a cobra lily for the deadly snake it resembles, this plant presents an even more ingenious trap. The pitcher ends in a flaring dome, with an appendage that looks like a forked tongue dangling from its mouth. The variegated red and green tongue produces nectar, as does the nectar roll on the lip of the opening. Once the unwitting insect lands, translucent windows in the wall of the hood create an illusory openness, and the poor bug enters thinking it's got an escape hatch. As in other pitcher plants, a combination of backward-pointing hairs and slippery patches usher the prey to its doom in a pool of seething bacteria.



LEFT: DAVID CAVAGNARO; RIGHT: MICHAEL S. THOMPSON



JO ANN ORDANO: PHOTONATS

*Far left: No, it's not a dance of kissing cobras, but the California pitcher plant, or cobra lily, of northern California and Oregon. Left: The purple blooms of *Pinguicula grandiflora*, a butterwort, rise on scapes above its flypaperlike leaves, while nearby, threadleaf sundews (*Drosera filiformis*) share the same damp, acidic soil and a similar diet. Above: Unlike pitcher plants native to the United States, tropical *Nepenthes* species are climbers.*

OF BLADDERWORTS AND BOG MONSTERS

Twenty years ago, only 450 species of carnivorous plants had been documented. Since that time, the number has risen by about 100, and new discoveries are continually being made, particularly among the Bromeliaceae of the Amazonian rain forest.

The ranks of carnivore connoisseurs are likewise swelling steadily. Joe Mazrimas, a research biochemist who grows carnivorous plants in a back-yard greenhouse in Livermore, California, founded the International Carnivorous Plant Society (ICPS) in 1972 with 150 members. The society grew out of a cross-country correspondence between Mazrimas and Donald Schnell, an East Coast aficionado. Together the two launched the quarterly *Carnivorous Plant Newsletter* and formed ICPS shortly thereafter. Today the society has about 900 members, with two-thirds of those in North America and the remaining third distributed internationally.

"Our membership runs the gamut from middle and high school students to adult hobbyists and professionals in the field," says ICPS's Leo Song. Song, a support technician in the biology department at California State University-Fullerton, acts as the society's business manager, and along with Mazrimas and Schnell, edits the ICPS journal. This informal triad is the closest thing the loosely organized ICPS has to an administrative body.

Song notes that other countries—the Netherlands, Germany, Japan (the first)—have carnivorous plant magazines, but they are published in their native languages. Because it is published in English, the *Carnivorous Plant Newsletter* reaches a wider audience.

This would seem to indicate that the mysterious allure of carnivorous plants is an ecumenical one. At first the idea of flesh-eating plants leaves some people incredulous, says Mazrimas. "Then there's the strange thrill in seeing a savagely beautiful plant snap shut on an insect. It's like turning the tables. Those plants are saying, 'You try that on me, sucker, and you get the trap.' Their ability represents a kind of revenge." Undoubtedly, the Venus's-flytrap's dramatic ability to move with uncanny speed and chomp its prey is what makes it the most popular carnivore among devotees.

Carnivorous plants may seem somewhat esoteric, but they are more formidable to houseflies than to growers. According to Merilee Maertz of California Carnivores, a nursery in Forestville, California, 90 percent of all carnivorous plants have the same cultural requirements. Her biggest sellers are Venus's-flytraps, sundews, and *Sarracenia* species. She especially recommends *S. purpurea*, "a really hardy little plant that grows from Nova Scotia to Texas."

For a growing medium, Maertz suggests a half-and-half mix of peat moss and perlite or horticultural sand. The plants can be grown in a plastic or clay container, although the clay pots should be of the glazed variety, since over time porous pots will absorb the mineral salts that carnivores can't tolerate. The pots should have drainage holes that admit water; the potted plants should then be placed in a dish or tray with an inch of water in the bottom. Also, it's imperative that your carnivore gets a minimum of three hours of direct sunlight a day.

Species of carnivorous plants can be found in almost any environment, but most prefer damp or boggy areas. Many gardeners elect to create their own outdoor bog gardens, complemented with other plants indigenous to such ecosystems. A large terrarium would also be an excellent way of growing carnivores, with a boggy area adjacent to a miniature pond for aquatic species of bladderworts (*Utricularia*). Uncompromising realists might even want to populate the terrarium with six-legged meals for their hungry pets.

Maertz would send out one final plea to carnivore growers, begging them not to succumb to a temptation that seems to be epidemic: Carnivorous plants have adapted to digesting insects, not ground chuck, and many need the writhing death throes of their prey to release sufficient digestive fluids. So whatever you do, don't feed your plants raw meat!

—Steve Davolt

Steve Davolt is editorial assistant of American Horticulturist. Free-lance writer Phyllis Zauner contributed to the above article.

Another genus of pitcher-type plants is *Nepenthes*, whose distribution is concentrated in the Malay Archipelago, with species also found in Sri Lanka, China, the Philippines, and northern Australia. These tropical versions differ from other pitcher plants in that most are climbers, ascending as high as fifty feet above the jungle floor. As in all pitcher plants, the urns are passive, filled with liquid in which the prey drowns after being attracted by the nectar. Once in a great while some tropical pitchers bag bigger game. The remains of scorpions, rodents, and small reptiles have been discovered in the giant urns of the larger *Nepenthes*, which in some species can get to be over a foot tall and about half as wide.

More common is the genus *Pinguicula*, the butterworts. There are approximately fifty butterwort species distributed throughout the world, several of which are native to North America. These pale green plants lie flat along the ground and produce attractive violetlike flowers. Small insects are attracted by their mushroomy odor and become trapped in the sticky glands covering the leaves, which subsequently curl up in a shallow bowl, not to clutch the victim but to form a pool for the secreted enzymes. The common name derives from their use in Scandinavian countries to curdle milk and produce a delicious cheese. In Switzerland, peasants rub butterwort leaves on cattle sores and find them healed within a few days.

Not to be confused with the butterworts are the bladderworts (*Utricularia*). The more than 200 species of this genus grow all over the world and illustrate the astounding variation in *modus operandi* among predatory plants. These strange rootless plants grow in mosses or float free in aquatic environments, and their tiny, pin-head-sized bladders are the fastest moving traps in the world. Guide hairs direct minute creatures toward small triggers, which cause a trap door to open so rapidly that the prey is sucked inside. The trap closes again within a thousandth of a second.

At least two bromeliads are known to be carnivorous. Like many bromeliads, *Brochia reducta* and *Catopsis berteroniana* grow epiphytically on trees, absorbing nutrients and moisture from the rainwater and wind-borne debris that collect in their cupped leaves. But unlike other bromeliads, the carnivorous species exude a slippery, waxy powder that causes insects to lose their grip and slip into the leaf cups to be digested.



Carnivorous plants are represented among the distinct flora of Australia by the rainbow plants—the two-foot *Byblis gigantea* and the four- to eleven-inch *B. liniflora*—which have delicate pink to purple five-petaled flowers. Their long slender leaves are covered with glandular hairs that catch insects attracted to the shining drops of sticky mucilage. The more the insect struggles, the more mucilage the plant produces. Finally, it comes in contact with other microscopic glands that secrete digestive juices and put an end to its struggles. At times, a plant will be almost completely covered with insects waiting to be digested.

Watching carnivorous plants in action is great entertainment, but there is a sobering side to their story. Many species are disappearing as their wetland habitats are developed out of existence; others are being shaded out by trees and other incompatible plants that in the days before “natural areas management” would have been checked by wildfires. Some species are listed as threatened or endangered within specific states. The horror-movie charm of carnivorous plants sometimes backfires against them: Venus’s-flytraps, for example, are sold in huge quantities as novelties, most of them destined to perish within days from neglect. Even though it is illegal to remove most carnivorous plants from public lands or from private property without the owner’s permission—and unnecessary, since nurseries easily propagate their

own—environmental groups believe that many are illegally collected anyway. Before you buy, question your source about its suppliers. There’s no reason we can’t have these charming eccentrics in our hot-houses, while leaving their wild brethren to go on trapping and munching.

Phyllis Zauner is a free-lance writer who lives in Sonoma, California.

SOURCES AND RESOURCES

The International Carnivorous Plant Society is a nonprofit organization devoted to promoting interest in carnivorous plants. U.S. and Canadian membership is \$15; international membership is \$20. Members get a subscription to the quarterly *Carnivorous Plant Newsletter*. For more information write: ICPS c/o Fullerton Arboretum, California State University-Fullerton, Fullerton, CA 92634.

California Carnivores, 7020 Trenton-Healdsburg Road, Forestville, CA 95436, (707) 838-1630. 30-page catalog and grower’s guide \$2, deductible.

Mellinger’s Inc., 2310 West South Range Road, North Lima, OH 44452, (216) 549-9861. Catalog free.

Orgel’s Orchids, 18950 S.W. 136th Street, Box K-6, Miami, FL 33196-1942, (305) 233-7168. Free price list.

Peter Pauls Nurseries, Canandaigua, NY 14424, (716) 394-7397. Free brochure.

*Left: The sundew genus takes its common name from its sunset colors and the sticky mucilage that glistens on its glandular stalks. Above: Of the more than 250 known species of bladderworts, many, like this *Utricularia inflata*, are aquatic, while others are terrestrial or even epiphytic.*



*Above: Pathologist George Newman indulges his penchant for pitcher plants. Right: Increasingly rare in the wild, the green pitcher plant (*Sarracenia oreophila*) can be found only in a few mountain bogs of the southern Appalachians.*

LEFT: MARTY CARLOCK; RIGHT: LES SAUCIER; PHOTONATS





Wooing Pitchers

A New Hampshire pathologist's hobby has him happily bogged down.

B Y M A R T Y C A R L O C K

George Newman has found a plant that can't believe it ate the whole thing. Among the scores of pitcher plants basking in the 90-degree heat of his greenhouse is one with indigestion.

"You can tell because there's rot on the outside of the leaf," he says, snipping the hollow, horn-shaped leaf and with surgical precision slitting it lengthwise. Indeed, the plant has overindulged. Clogging the throat of the modified leaf that forms the pitcher are undigested ant and wasp body parts; Newman also points out moth wings and the iridescent head of a greenhead fly.

Actually, it's not the plant's fault. Although it lures insects with color and odor as does the slightly better-known Venus's-flytrap, it differs in being unable to shut its "mouth" when it captures a morsel. Ideally, the bug will slide all the way down its slippery, tapering throat and drown in the spoonful of digestive juices at the bottom. It was just tough luck that this time an oversized tidbit got caught midgullet.

To the human nose, some members of the *Sarracenia* genus are less than alluring. "*Flava* smells like cat spray," says Newman. "But they vary. *Rubra* smells like roses."

Clearly, insects think they all smell great. The hothouse is abuzz with unsuspecting bugs that believe they are going to get a meal, not be one. Newman leaves the doors open all summer so his carnivorous plants can fatten up, and they do.

"The pitcher plants inside are showier," he says, and with the optimal growing conditions, larger too. Nevertheless, Newman succeeds in growing at least five species, plus countless volunteer hybrids, outdoors here in Bedford, New Hampshire, in USDA Zone 5 on the edge of Zone 4.

It's a gorgeous afternoon, the sky lobelia blue. Newman, a pathologist, is just back from his rounds at Elliot Hospital in Manchester. But he has obviously prepared for his visitor. He offers a list of *Sarracenia* species and subspecies photocopied from *Carnivorous Plants of the World* by James and Patricia Pietropaolo, a good introduction to the subject. Newman grows all ten species, six subspecies, and numerous hybrids, both accidental and deliberate. He also has the only West Coast carnivore, the cobra lily, or California pitcher plant (*Darlingtonia californica*). It's fairly finicky and not hardy, so he keeps it in his orchid greenhouse, a separate, cooler environment where humidifiers exhale constant moisture. Says Newman: "It grows in a very narrow range—northern California, southern Oregon," where it is found along mountain streams.

Below: Yellow trumpets (Sarracenia flava) appear almost capable of making music. Bottom: The flowers of S. purpurea range from pink to a deep plum purple.



He leads the way to his far-from-typical front yard. There's no grass. We walk past birches and a stand of cultivated fireweed and find ourselves on some gritty, inhospitable soil—his bog. When Newman and his wife, Sally, built their new home here seventeen years ago, the land had been woodlands. "We didn't know it would be so suitable for a bog," he relates. "We were fortunate."

"I don't think the bog would have worked if we'd had a lawn before," muses Newman. "The fertilizer would have seeped down and ruined it." Even before building his bog garden, he had been growing *Sarracenia* for more than a decade. He still has a *S. psittacina* he acquired the year he and Sally were married, twenty-eight years ago, when he was a medical student at the State University of New York at Syracuse. A native of the Bronx, he honed his innate love of plants at the nearby New York Botanical Garden.

Now here in New Hampshire he has his own miniature botanical garden on a three-and-a-half-acre plot. It holds some 800 species of native plants; he estimates that he planted 750 of them.

Newman found that his front yard was mostly clay. He excavated a hundred or so square feet, leaving enough clay to maintain the naturally high water table, and refilled it with his usual mix for growing *Sarracenia* indoors—half to two-thirds

peat moss, plus some sand. Though it's technically a bog, water doesn't flood to the surface, and that's how pitcher plants like it.

"I don't like to grow things solo," the doctor says, so along with the carnivores he planted native rhododendrons, living sphagnum mosses, *Iris prismatica*, gentians, native orchids, sheep's laurel, and cranberries, which he and Sally harvest. Among the pitcher plants, *Sarracenia purpurea* especially likes a little shade and a little competition, he says.

Getting down to bug's eye-level, we find another carnivore, the threadleaf sundew (*Drosera filiformis*), glittering in the sun. What look like diamonds of dew are really drops of sticky gnatcatcher fluid that the plant exudes.

But his real love is his pitcher plants. The native range of *Sarracenia* species is the Eastern seaboard and the Gulf Coast, extending as far west as eastern Texas. Wide-ranging *S. purpurea* is the provincial flower of Newfoundland, and an indigenous population has recently been found in British Columbia. *Sarracenia* won't grow in standing water. Their usual habitat is a sunny place—Newman says his seem to need six hours of sun a day—where the groundwater level is high but the surface seems dry. Down South, Newman says, pitchers like to grow in wiregrass savannas, where it's open and slightly damp. A swamp is not only too wet but too rich in mineral salts for carnivores, which get their recommended daily allowance from digested prey.

One of Newman's toughest plants, a natural hybrid between the northern *S. purpurea* and the southern *S. flava*, has survived outdoors for twelve years. "The hardest winters are the ones with no snow. I don't cover anything." He loses plants sometimes, but his bog seems chock full. "They've back-crossed all over the place. These plants are very promiscuous," he says, pointing out volunteers of varying forms and colors.

Though less husky than their hothouse kin, the outdoor pitcher plants aren't suffering. In fact, some are so pleased with their environment that they've wandered past Newman's split-rail fence and reproduced colonies at the roadside.

In the greenhouse, the doctor sets pots into deep rectangular plastic tubs, the kind bus boys put dishes in when they clear the table. "They're nontoxic, and I get them from restaurant supply for three dollars



each," says Newman. Four six-inch pots fit snugly into each one, their bottoms in two to three inches of water.

Newman and his wife have tramped swamps throughout the nation to add to his plant collections. He usually collects seeds or cuttings, although sometimes he will take an entire plant or two if they are numerous and he can obtain permission from the property owner. He has occasionally collected more plants from areas that were being destroyed.

In Alabama, he sought a specimen of *S. oreophila*, which occurs only in limited areas of that state and Georgia. He found some, but the farmer who owned the property was mowing them down. Because they were rare, environmental officials were trying to protect them, and the owner resented the government's telling him what he could and couldn't do on his property. If Newman wanted some plants, the farmer told him, he'd have to take a picture of him and his coon dogs. Newman did, and the farmer let him have two tiny pieces.

"In the South these things grow by the thousands," he says. "I don't collect in bulk. If it's really rare, I grow it from seed or by division. You can divide them, like iris."

If you want a pure species, you have to isolate it, because plants interbreed so readily. Usually, says Newman, "I cut all the seed pods off and throw them away."

Seeds, which he plants in pure sphagnum peat moss, take a year or two to germinate. "I plant them when it's cool out. Spring or fall. I keep them at 40 degrees and very wet. The germination is very variable, usually in the spring."

He displays a four-inch-deep tray of *S. purpurea*, tiny pink curls less than an inch long. These are one-year-old seedlings. They will stay minuscule for about three years, then they will triple in size annually for the next few years, taking five to eight years to finally bloom. The mature pitchers eventually reach a length of eighteen inches.

During plants' first year growing from seed, he experiments with a dilute solution of fertilizer—one-eighth to three-eighths of Miracid, orchid fertilizer, or 20-20-20 house plant food. He doesn't apply it often, because it turns the sphagnum slimy. And he only tries it on half of the plants "in case it kills them. If it works, it will save you a few years." Once they have pitchers and can feed themselves, he stops. "Fertilizer is better underdone, or not at all."

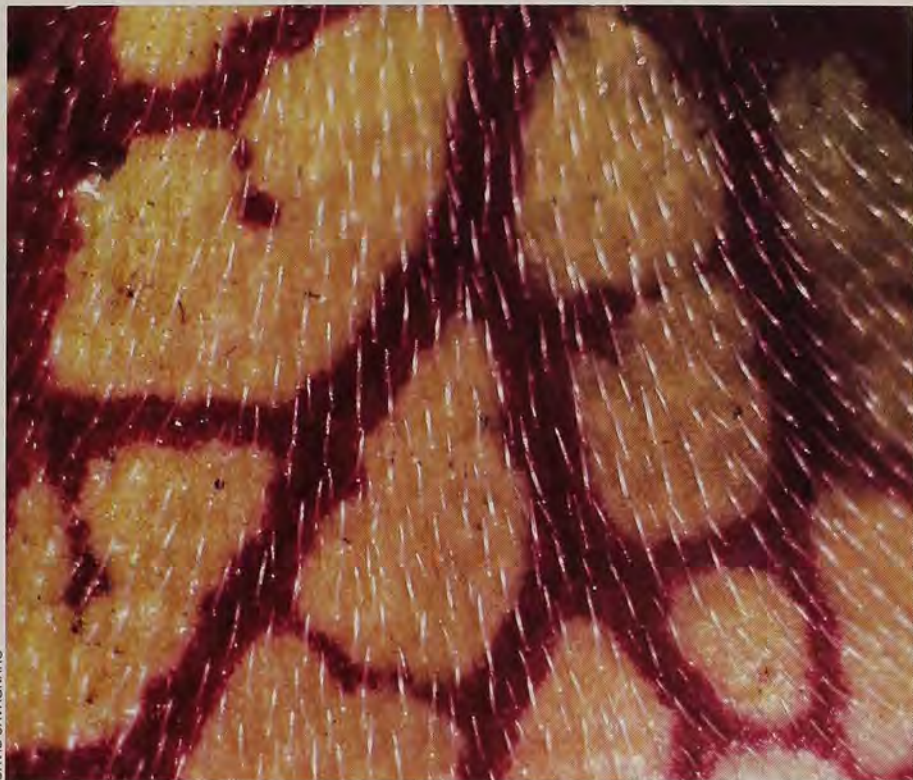
Barrels under his eaves trap rainwater for the greenhouse collection, which re-

quires fifty-five gallons every three days. Distilled water is an alternative, but not water from a water softener, he says, because it's too alkaline. When people fail with pitcher plants, he believes, it's because they use water containing too many mineral salts.

Because winter dormancy is essential, indoor plants require some sort of cold treatment. "I put the plants into the basement, in basically a root cellar environment—gravel floor, no light, sitting in about an inch of water, and I try to keep the temperature at about forty degrees." In February, he repots and cleans the plants in preparation for a new growing season.

Apart from maintaining seasonal cold dormancy, Newman says his biggest preoccupation is protecting his pitchers from aphids. Aphids are a serious threat to pitcher plants. They're not interested in the nectaries but go right for the new growth at the top of the pitcher. Unfortunately, the milder insecticides don't work on them. When Newman's are infested, he sprays them with half-strength Malathion. Insecticidal soaps, he says, will contaminate the soil. "Soaps are alkaline. I used one once and it was a disaster." It appears that there may be a natural justice at work, when plants that devour moths and wasps are at the mercy of another insect, and that the tiny aphid.

Boston free-lancer Marty Carlock writes about nature, art, and education for the Boston Globe and other publications.



DAVID CAVAGNARO



LES SAUCIER: PHOTONATS

Top: Inside the throat of a pitcher plant myriad short hairs are angled in such a way that trapped insects are prevented from retreating. Above: A single droplet of a sundew's mucilage is often enough to snare a gnat or mosquito.

The Incidental Ornamental

Now a big star, the New Guinea impatiens had a mere walk-on role during a 1970 plant-hunting trek.

B Y K A T H L E E N F I S H E R

After thirteen days, the Mid-Atlantic's heat wave and drought seemed to be slacking off, but it was too late for much of the merchandise at the local plant center. A sign on a huge table announced that four-inch pots of impatiens were now ninety-nine cents each. Given their leggy, limp condition, it was no bargain. But at the far end of the display, with stems still as stiff as shrubbery, perhaps fifteen New Guinea impatiens flaunted their flamboyant bronze and variegated foliage.

"How much are these?" I asked a student who was carting drought-ravaged celosias to a dumpster.

"Ninety-nine cents." He waved toward the sign.

"But this one says \$3.99."

"They're ninety-nine cents. And our celosias are free if you want any."

I passed on the celosias. But the New Guineas were a steal: not because they were healthy, or because each of the three I chose had a different foliage color, or even because one had the double flowers that just came on the market this year. New Guineas are a Plant With a Story. And getting a Plant With a Story is like getting a free novel with your purchase.

This is no wimpy tale of Victorian symbolism or ancient myth, but a real action saga with intrepid hunters and scantily clad natives, obsessed scientists, and determined breeders—a tale replete with ironies. In 1970, the New Guinea impatiens, lost to temperate-climate gardeners for a century, was rediscovered and turned into a blockbuster hit with speed that—for the horticultural world—was almost dizzying. By 1977 there were more than sixty cultivars on the market.

"I can't think of anything like it in recent history. It had the excitement of new discovery," says horticulturist Tovah Martin, who grows the plants at Logee's Greenhouses in Connecticut. The public's reaction to the plants, she said, "reminded me of what it must have been like in the nineteenth century" when the air was almost electric with exotic plant finds.

Robert Armstrong, research horticulturist at Longwood Gardens, was one of the first people to experiment with the rediscovered plants. At first, he was skeptical about their potential. Today he says: "It may very well be a once-in-a-lifetime plant."

The first record of a New Guinea impatiens mentions one sent to Kew Gardens in

LEFT: COURTESY OF MIKKELSEN'S, INC.; OPPOSITE: J. J. HIGGINS

Above: 'Etude' represents the latest twist to New Guinea impatiens: double-flowering cultivars from Mikkelsen's. Opposite: At Ekuam in New Guinea, a native holds a Freycinetia species, a member of the screw pine family. The natives were enthusiastic assistants, sometimes collecting flowers both for their hair and for the American scientists.



*Below: Hiking to the village of Arigenang, Harold Winters and Joseph Higgins were deserted by their equipment bearers. Villagers allowed them to stay in one of their huts for several days. Bottom: Outside Arigenang, Winters takes a cutting of *Rhododendron zollerii*. *Rhododendrons* were the primary goal of the 1970 collecting expedition.*



1894. It was apparently collected by a Lieutenant Hawker, a nurse. Two years later the plants were wildly popular in European gardens and greenhouses. But by the early 1900s, a susceptibility to begonia mites brought the craze to a halt. New Guineas still fascinated explorers, who combed the island's mountainous terrain for new species, risking encounters with cannibals. But to the average gardener, they remained a largely inaccessible oddity.

Papua New Guinea is among areas that some scientists call refugia. Evolutionary theorists believe these places are especially rich in species diversity because they have been sheltered from climatic and ecological changes that cause extinctions elsewhere. Unfortunately, they are not necessarily sheltered from human interference.

By 1970, the natives' diet no longer included humans. Roads and airstrips built in World War II criss-crossed the country. For plant hunters, these developments were a mixed blessing. They could get to the plants more easily. But great swaths of forest were being cleared to make the roads, and a growing population—the result of successful health programs—demanded the sacrifice of even more forest for farmland.

Because of this increasing ecological vulnerability, New Guinea was chosen as the destination of the twelfth of thirteen expeditions sponsored jointly by Longwood Gardens in Kennett Square, Pennsylvania, and the U.S. Department of Agriculture's Office of Plant Introduction. Picked to lead the expedition was Harold Winters, a horticulturist who had come to the Beltsville headquarters of the USDA's New Crops Research Branch from Puerto Rico in 1956. Joseph Higgins, a plant physiologist who had been studying the insecticidal properties of *Tephrosia* species and the effects of climate on crop yields, was chosen to accompany him.

John Creech, who at that time was chief of the USDA's New Crops Research Branch, explains that for each trip, the USDA put together a team with varied backgrounds, usually a botanist and a horticulturist, but once also an entomologist. The team approach was also for safety. "If a person alone is injured, he may have no way to get back out."

Creech had led some of the earlier trips, but his interest was primarily Asian plants. Winters was a tropical plants expert who had spent thirteen years in Puerto Rico working with the cinchona plants once



used to produce quinine, and studying the adaptability of U.S. vegetable crops there and elsewhere in the tropics. Higgins was a skilled photographer who could make an instant record of their collections.

The ambitious Longwood-USDA cooperative venture, the brainchild of Longwood Director Russell Seibert, has not since been duplicated in scope. Private organizations like Longwood lack the federal government's entrée to foreign countries and its channels for importing plants. But USDA funding gives priority to food crops, rather than ornamentals. Longwood paid the tab; the USDA cut the red tape.

The western half of New Guinea, the world's second largest island, was governed by Indonesia and would not be accessible. But the eastern half, the territories of Papua and New Guinea, were administered by Australia, and its scientists were also concerned about threats to native plants. John S. Womersley, chief botanist of the forest department at the Lae Botanic Garden in New Guinea agreed to provide a base of operations for the team.

As with earlier Longwood-USDA trips, other botanical gardens, breeders, nurserymen, and other plant people were invited to submit requests. The star attraction was the island's rhododendrons; more than 150 species are endemic to New Guinea. Most wouldn't be hardy in much of the United States, but it was hoped they could provide



COURTESY OF J. J. HIGGINS

Above: Joseph Higgins examines a red-fruited *Citrus atlantica*. Left: 'Mount Kum', one of the twenty-three original New Guinea collections, photographed by Higgins eight years later.

genes that breeders could tap for new flower colors, fragrance, shapes, and sizes. The USDA's Branch Cancer Screening Program wanted two plants for potential anti-cancer properties. Its Fruit and Nut Branch wanted a microcitrus, or finger lime, and the Soil Conservation Service wanted several grasses.

The New Guinea impatiens was practically an afterthought. How it came to be on the list is something of a mystery. Winters says interest in it was roused during correspondence between himself and Claude Hope. Hope had once worked for the USDA's plant introduction office. Later, as an independent breeder, he turned the African *Impatiens wallerana* into one of America's most popular garden plants. (See "El Capitan de las Flores," *American Horticulturist*, October 1992.)

But Hope denies nominating impatiens as botanical quarry. "I had heard of them from some Australian visitors," he says, "but I had no lines of influence to inspire the collection."

Plant collectors can't just hop a plane and begin tramping through the jungle. More than a year before they left, Winters began reading and corresponding with experts about plants they might encounter.

On January 4, 1970, they flew first to Hawaii to study New Guinea plants at the Bishop Museum in Honolulu and consult with horticulturists at the University of

Hawaii. Their next stop was New Caledonia, 900 miles east of Australia, to collect three conifer species for the U.S. Forest Service and the plants sought as anti-cancer agents. Then they stopped in Brisbane, Australia, to study more New Guinea plants at the Queensland Herbarium and the Brisbane Botanic Garden.

Higgins would write dozens of letters home from New Guinea during their ten weeks there, and today the wonder he felt is still fresh on their pages. "I don't know how to explain the feeling I had throughout the entire trip," he wrote of one day's excursion. "It had something to do with the trip being something of an epic—with the fantastic up & down, twisting switch back roads—and all those mountain sites—and long, long great vistas between ranges—the natives just seem to get to me—they are so simple and interesting—so very friendly—I think I waved at 60-70 % of all the natives I saw & they wave back & yell—big smiles from all ages & sexes. It's so very fantastic—not like a real world."

Long gone, of course, were the days of packing plants in Wardian cases to sail for months on the high seas. But while air travel and all-terrain vehicles made plant hunting somewhat simpler than it was a century earlier, the trip didn't lack for harrowing moments. In a letter dated February 12, Higgins recalls the single-engine Cessna they flew northeast of Lae on the

Huon Peninsula. "The mountains were almost 10,000 feet. The landing strip at Mindik Village at 4,100 feet looked like a postage stamp."

At Mindik they hired a dozen bearers to carry their 1,100 pounds of gear to the village of Arigenang. "After a half day's hike up & down and around many mountains we reached the village and were abandoned immediately by our bearers after receiving each of their 7 shillings—our new natives gave us one of their village huts to stay in for the next several days," Higgins wrote. At the lower elevations, the temperature was often around 90 degrees; on Mount Wilhelm, which they climbed to 12,000 feet, it was near freezing with constant drizzle.

Much of the time, it was just plain hard work. Several times a day they stopped their Toyota Land Cruiser to press specimens, make cuttings, and stuff individual species into plastic bags. After a full day of collecting, they might spend another two hours pressing plants before going to bed on a crude cot. "It's tough pressing a nine-foot-long leaf with a base as big around as a lemon," Higgins wrote of one palm specimen.

Then there was the language barrier; the natives spoke 700 dialects. Fortunately Andrée Millar, Lae's botanist and curator who accompanied them on three outings, had a good command of Pidgin English "which really is the key of our great success



Above: 'Sonata', another new double from Mikkelsen's. Opposite: 'Gemini', one of forty cultivars released in Mikkelsen's Sunshine series in the 1980s.

to date," Higgins wrote on January 23.

The natives called Higgins "Masta Mausgras"—Mr. Mouth Grass—in honor of the facial hair he was sprouting. Winters, who at six feet towered over most of the natives, they dubbed "Masta Long Fella Yank." Particularly if the natives were shown drawings of the plants being sought, they were so effective at finding them that Higgins sometimes wondered if he and Winters would have anything left to do, or if the USDA greenhouses would be able to hold all the bounty. "If they bring in a couple of good plants—especially with flowers—we give them a shilling or a 10-cent piece. If their plants are not particularly interesting we give the men and women a stick of tobacco and 1 sheet of newspaper from which they make paper cigarettes. For the kiddies who do not bring in good stuff, they get a couple of cookies. After a while they bring in a lot more of the things we want than we can use—there is a limit—and we have a hard time convincing them when we don't want any more of a certain plant."

On the return trip from Mindik, during which black clouds forced them to fly at 5,000 feet and lower between the mountains, "every square foot was packed with plants, plus plants on our laps," Higgins wrote.

They collected impatiens on the first full day out, along an area called Edie Creek, and later in two other locations. They also found some cultivated impatiens; to adorn their homes, natives would take cuttings

from the wild plants, which rooted easily in the damp climate. Still, the pair weren't particularly excited by them. Instead, "I seem to have become something of a fern nut," Higgins wrote his wife. "Harold is always very busy searching for exotic flowering material and orchids and feels the ferns are the weeds of the tropics."

Ideally, if the season is right, a plant hunter collects seeds, which are more likely to tough out a long journey than cuttings are. But the trigger happy pods that give impatiens their name made this an exercise in frustration. So they took cuttings, "not at their softest," says Winters, "but in a semimature woody state" and popped them in polyethylene bags that they punched holes in with pencils.

Frustrations didn't end when the plants were packed. Transit workers lacked the American sense of urgency. Plants could arrive back in Beltsville in five days or twenty. One huge shipment, including many impatiens, was lost when it was left to broil on a tarmac. In all, half of the fifty impatiens collected died in transit, although the team recollected as many as possible.

When they returned on April 14, they had succeeded in sending back 868 plants.

Horticulturists at both of the sponsoring institutions had mixed feelings when they first saw the impatiens. H. Marc Cathey, recently named President of the American Horticultural Society, was then chief of florist and nursery crops for the USDA. He recalls inspecting the quarantined plants

with plant geneticist Toru Arisumi. They were tall and scraggly. "But they had unbelievable foliage," Cathey says, "like birds of paradise."

USDA researchers can't set out to breed plants for commercial purposes. Arisumi's task was to get basic information: Would these impatiens cross with *I. wallerana* or lesser-known impatiens from elsewhere in the world? How long would they flower? What growing conditions did they like?

It quickly became obvious that the New Guinea species and *I. wallerana* were incompatible. They would cross with others collected from Java and Celebes, but the offspring were sterile. In 1976, he developed the orange-flowered, variegated 'Sweet Sue' by crossing a New Guinea and a Celebes cultivar, 'Tangerine', and made it fertile by treating it with colchicine. The late Arisumi, whom Cathey recalls as "a remarkable cytogeneticist," would tenaciously explore the impatiens' genetic make-up well into the next decade.

Longwood's Armstrong had a similar, even less favorable reaction. "In the beginning, everyone sort of pooh-poohed the idea that these could go anywhere," he says. With their gangly shape and pale flowers that showed their faces only fitfully, they had all the appeal of awkward adolescents. True, a few of the flowers hinted at brighter color, but they were the smallest of the lot. "We knew we weren't the only ones doing work on them"—thirty-six public gardens, nurseries, or individuals were on the distribution list—"and we almost threw them out."

In a way, that's what he did: he escorted them outdoors. And suddenly, the sleeping beauties awoke. Out of the shade favored by their *I. wallerana* cousins, the foliage took on color. The lanky shapes became more compact, and with cooler fall weather, flowering began in earnest.

Of twenty-three impatiens released by the USDA—many were given Pidgin English names, including 'Masta Mausgras'—the species of eleven were unknown, so Armstrong took a shotgun approach to breeding. He crossed each specimen with every other specimen until he had more than 300 hybrid seedlings. In 1974 Longwood released ten hybrids, given colorful circus names like 'Carousel' and 'Lollipop'. Armstrong would release ten more in 1977 and six in 1979 before taking up other pursuits.

Mikkelsen's, Inc., a wholesale nursery in Ashtabula, Ohio, grabbed some of the



original New Guineas and today remains their biggest producer. Jim Mikkelsen, its now retired president, arguably deserves most of the credit for the plant's commercial success. Says Cathey: "He literally took what the USDA was doing and made it valid for gardeners." Mikkelsen released its first series in 1976 and sold several hundred thousand. "Until 1980, not many other people were interested in propagating them," says Ed Mikkelsen, Jim's son. There are forty different cultivars in the Mikkelsen Sunshine series—most of the plants have space-age names like 'Gemini' and 'Quasar'—and this year they've spiced up the market with double-flowered New Guineas and 'Tempest', a red and white bi-color with leaves variegated dark green, red, and cream.

Iowa State University, which first obtained New Guineas for an honors student project, also began a breeding program, and by 1989 had released twenty-one cultivars. The head of that effort, Jack Weigle, recently retired. But two other ISU researchers, Loren Stephens and Nancy Agnew, continued basic studies on breeding and shipping the plants.

For if the New Guineas were imperfect when they arrived in Maryland they are imperfect still. They were touted from the beginning as impatiens that could take full sun. But while the sun brought out their

glory in Pennsylvania, summers in Kansas and Georgia fried their foliage as crisp and brown as bacon. Gardeners felt they'd been burned as well.

Growers concluded that they can take sun; it's heat they don't like. Now the advice is to give them shade, at least in the afternoon, and lots of water. Breeders, far from just being able to play with such niceties as bigger flowers and new foliage colors, still have to iron out kinks in the plant's genes that make it incompatible with the water-wise gardening of the '90s.

And breeders still haven't developed a first-class New Guinea that can be reproduced from seed. As a result, a New Guinea costs four to six times as much as an *I. wallerana*. Hope did produce two, one of which—"Tango"—was an All-America Selections winner, but even he admits that the seed-grown plants aren't up to snuff yet. This year, however, PanAmerican Seed took another step forward by releasing separate colors of 'Spectra', a seed-produced hybrid sold previously as a mix.

There's incentive to keep trying: a 1988 federal Census of Horticultural Specialties showed wholesale sales of New Guinea impatiens of nearly \$16.5 million. And while some big nurseries, such as Yoder Brothers, have given up on New Guineas, others, including poinsettia-giant Paul Ecke, recently jumped aboard the bandwagon.

What are the chances there is another New Guinea impatiens in a rain forest or on a mountain top just waiting for another Higgins and Winters?

"In my personal view, there's almost no limit to the new and exciting plants that could be tested and developed and marketed," says Barry Yinger, who was a plant explorer for the USDA and is now doing the same for Hines Nurseries, the nation's largest plant wholesaler. "It's easy to find new plants in the wild and being cultivated in other countries. The difficulty is in what happens to a plant after it arrives in this country. Public gardens have been ineffective getting plants into the trade."

For example, Winters and Higgins also collected specimens of aroids, ferns, gesneriads, gingers, and hoyas, and of course, rhododendrons. What became of all of them?

Creech says that of the many individuals and institutions that received plants from the trip, few were systematic about reporting on their fate. "I would hate to count the plants that came in and were not protected," he says. "Botanic gardens are in-

'Arabesque' was named in 1974 by the USDA's Toru Arisumi, a cytogeneticist who studied New Guinea impatiens for nearly twenty years.



ANITA SABARESE

clined to throw things away. There's an attitude that we can always go back."

Of all the botanical gardens in the United States, the Missouri Botanical Garden has by far the most field scientists scattered throughout the globe. But they're concerned with basic research: helping develop flora of the countries they explore, identifying plants and clarifying their relationships. Says Missouri's Horticultural Director Shannon Smith: "Commercial potential is way down on their list, and rightly so."

Today, plant hunters with gardeners in mind are less likely to bring back a fussy parakeet of a plant—beautiful but out of its element—than to snare specimens that might help give our current favorites some environmental fine-tuning—making them more resistant to cold or drought or salt.

A good example is a three-week trip to China taken this summer by Lawrence Lee of the U.S. National Arboretum, Paul Meyer of Morris Arboretum in Philadelphia, Peter Bristol of Holden Arboretum in Mentor, Ohio, and Kris Bachtell of Morton Arboretum in Lisle, Illinois. Not surprisingly, the three northern arboreta were interested in plants that would tolerate cold. Their representatives looked for plants like the three-leaved maple, *Acer triflorum*, which has exfoliating bark and in China reportedly grows farther north than it has been found previously, and *A. manchurium*, another cold-hardy maple.

Even more than in 1970, explorers today are extremely sensitive to the rights other nations have to their native germplasm. China is welcoming these horticulturists to its remote areas in exchange for technology and information: western publications, help with research on native flora.

"The problem with bringing back what you might call blockbuster plants," says Lee, "is that they're likely to be rare and endangered, like their silver fir. And we don't deal with rare or endangered plants."

Creech says the nursery industry doesn't seem interested in importing new plants or building up their "infrastructure" of variety. Cathey and Hope also think the industry is too conservative. Nurseries, Cathey says, "want plants like those they're used to—the superstars of the garden, like mums."

Breeders, says Hope, are always looking for the "next impatiens," but the large seed companies that control so much of the market are unlikely to approve a project that may not pay off for ten years. "It is hard to believe that there is another species out there that is capable of catching the



J. J. HIGGINS

public fancy like impatiens," he says. "Wild collections, almost certainly, will require years of work to make them acceptable for the very critical buyers."

But on this score, Yinger sounds a highly hopeful note. He agrees that until lately, commercial nurseries did virtually nothing in the way of exploration. But now he believes they have no choice, because gardeners are becoming more sophisticated. "The demand for commodity plants—junipers, Norway maples, arborvitae—is level or dropping. Partly because of the small size of today's gardens, people are looking more carefully at what they plant. Nurseries are going to have to introduce plants that excite people's interest with color, fragrance, growth habits. People want grasses, aquatic plants, dwarf plants, herbaceous perennials, shade plants. Things that fit into little subcategories of gardening expertise."

Yinger's highest priority will be Japan, but he also plans to travel to Korea, China, Pakistan, Mongolia, tropical Asia, and the western Himalayas. And he sees no reason why gardeners can't have more of these plants in three or four years, rather than ten.

It's heartening to think that Yinger is right, and that in a few years, nearly every plant in the local garden center will be a Plant With a Story. And that would be the New Guinea impatiens story's final irony: like "Dog Bites Man," it would no longer be novel at all.

Kathleen Fisher is editor of American Horticulturist.



DAVID CAVAGNARO

Top: New Guinea impatiens light up a shady planting of shrubs and ferns at Brookside Gardens in Wheaton, Maryland. Early cultivars got a bad reputation because they were sold as sun lovers. They need protection from afternoon heat. Above: 'Tango', developed for PanAmerican Seed by Claude Hope, was an All-America Selections winner.



The Kentucky Coffee Tree

Like a Derby winner, this overlooked native can go the distance.

B Y A D E L A I D E C . R A C K E M A N N

About twenty years ago, a friend gave me a few seeds of what he called “mahogany.” One of the seeds I planted outdoors actually came up. But after its first leaves appeared, it was obvious that the tree was nothing like the mahogany I had seen in the Dominican Republic. Later I learned that “mahogany” is the Maryland term for what most people call the Kentucky coffee tree (*Gymnocladus dioica* or *dioica*). Why it should remind anyone of a tropical timber tree I’m not sure, but its handsome, reddish brown wood is said to have inspired some ambitious cabinetry on the part of our ancestors. The tree has attracted other odd nicknames as well. French Canadians call it *chicot*, or “dead tree,” since for six months of the year it shows no sign of life. Perhaps for the same reason, southern mountaineers call it “stump tree.”

Whatever it’s called, the coffee tree is one of our most distinctive native deciduous trees. Growing in the open, its general habit is a little like that of the American elm. But in forest conditions, its oval crown is straighter and more compressed. It can reach perhaps 100 feet. At Longwood Gardens in Pennsylvania, for instance, there is a small stand of coffee trees, some of which approach this height.

The coffee tree is most striking in winter. Its trunk usually forks close to the ground, and its stocky branches terminate in crabbed, angular twigs that appear to be scratching the sky. Its rough bark is covered with tortuous, scaly ridges that tend to curl up along their edges, exposing an inner bark sometimes tinged with gray or pink.

It leafs out late in spring—usually not until mid-May. Its leaves are bipinnate, an arrangement in which a main stalk gives rise to secondary stalks that hold the leaflets. Called a “rachis,” the main stalk is a sort of backbone for the whole structure, which can reach a yard in length.

By June the coffee tree is producing its rather inconspicuous, greenish flowers. The species is usually dioecious, which means a plant will produce flowers of only one sex. But some coffee trees are polygamo-dioecious, which means that in addition to flowers of one sex, a plant will also bear bisexual flowers. The flowers occur in panicles up to a foot long for the female and about four inches long for the male. By late June, the coffee tree’s other reproductive strategy becomes apparent as well: shoots may emerge from its roots, sometimes a good fifty feet away from the parent plant.

The tree is beautiful in fresh leaf, but it gives only dappled shade in summer, and I find



RIGHT: AL BUSSEWITZ; PHOTONATS; OPPOSITE: ANITA SABARESE

Above: The coffee tree’s pods are its most distinctive feature. Opposite: Fall foliage can be dull buff or lively yellow, but its forked branches make it a winter standout.

In late May or early June, the tree is producing its greenish flowers. Plants usually produce flowers of only one sex.



CHRIS BRIGHT

its summer habit loose and somewhat coarse. Its fall color is usually an unmemorable yellow. Michael Dirr, in his *Manual of Woody Landscape Plants*, describes the display as “often ineffective,” although on some trees he says it is “excellent.” My own tree is reasonably attractive, but many hardly color at all. Leaf drop tends to be messy because of the large rachises. But then, if your tree is a female, you can see the five- to ten-inch long, reddish brown seed pods, each containing about six substantial seeds. (Good crops are usually produced every second or third year.) The pods may remain on the tree all winter and on some trees, they drop without ever having opened. But other trees spill their seeds at the end of fall, leaving the pods hanging empty from their limbs—a haunting evocation of the dying year. As Donald Culross Peattie describes it in his *A Natural History of Trees of Eastern and Central North America*, “Only the great pods cling on, like open purses, their contents scattered in a spendthrift’s gesture.”

These fruits are perhaps the feature that has attracted the most comment. Donald Wyman, in *Wyman’s Gardening Encyclopedia*, calls them “merely large ugly pods.” Some people dislike them because they rattle in the winter wind. On the other hand, Dirr says the seeds “are great fun to throw and hit with a baseball bat.”

The tree’s range is a rough triangle from New York west through Minnesota and south as far as northern Alabama and Mississippi. It prefers the deep, rich soils of bottom lands and can often be found in ravines or along moist slopes. It can, however, be grown far north of its native habitat: it is hardy to Zone 3 and will survive in southern Ontario and Quebec.

The tree gets its common name from the pioneers’ use of the seeds as a coffee substitute. Roasted, ground, and brewed, they produced a drink that resembled coffee in appearance if not in taste. Thomas Nuttall, who explored the Arkansas Territory (modern Arkansas and Oklahoma) in 1819, observed that the seeds, “when parched, are

agreeable to eat, but produce a substitute for coffee greatly inferior to the *Cichorium*.” Nuttall presumably got the idea of eating the roasted seeds from Native Americans. Native peoples may even have valued the seeds enough to plant the tree where they couldn’t find it, thereby extending its range. Roasting is an essential preliminary to eating, since the raw seeds are poisonous. So too are the leaves: cattle have been poisoned by drinking from water into which leaves and seed pods have fallen.

Its culinary appeal may have been limited, but colonists discovered that its decay-resistant wood made durable poles and fence posts. The wood also lends itself to more refined uses, but the coffee tree has never interested the lumber industry because it does not occur in stands of any size.

It did, however, interest the plant collectors who first encountered it, and the coffee tree was introduced by 1748. Brought to Europe by persons unknown, the tree was cultivated as a New World botanical curiosity. It acquired American enthusiasts as



The ridges of the coffee tree's bark curl up along their edges. The wood is durable, but because the tree does not occur in large stands and forks close to the ground, it has never interested the lumber industry.

well, among them Thomas Jefferson, who planted it at Monticello. It's true that the coffee tree never enjoyed the ornamental success of, say, the American elm. But well into this century, the coffee tree was often planted in the parks of East Coast cities. It's hardly used today, but Nina Bassuk, director of the Urban Horticulture Institute at Cornell University, included it on a recent list of recommended city trees.

Despite its obscurity, there is much to be said in its favor. For one thing, it has virtually no diseases or pests. My own tree is slow growing, but under ideal conditions a young tree can put on more than a foot a year. It's also drought resistant, although it may shed most of its leaves as a defense mechanism in prolonged dry spells. And while it prefers moist, rich soil, it can stand just the opposite, which is pretty much what it gets from me. My tree, now more than twenty feet high, is decidedly undemanding. It has never been watered, fed, pruned, or received any other attention. The soil where it grows is acid and poorly drained. Despite

all these handicaps, it's doing well. Since drought is likely to remain a problem for gardeners, it seems a good idea to grow trees that don't require much water.

The coffee tree is easily propagated from cuttings or from seeds. Most garden books insist that the seed coat must be perforated or scarified with acid before planting, which should be done in spring. But my own tree was grown from a plain, unscratched, unsoaked, untouched seed. Although propagation is a simple matter, few nurseries seem to be interested in doing it. In the Baltimore area, for example, the tree is rarely offered. I know of only a single cultivar, a British form called 'Variegata', which is apparently unavailable in this country. In his manual, Dirr describes a 'Variegata' that he encountered at Kew Gardens as having gray green foliage "irregularly peppered and streaked with creamy white variegation." Dirr says he had to get close to appreciate the pattern, which complemented the tree's "pinkish to purplish new growth."

The coffee tree's ability to reproduce—and even thrive—in the face of adversity was brought home to me while I was writing this article. I was fascinated to find growing, far from the tree I had grown from seed, another very young coffee tree that I had not planted. I had not seen it before because its first shoot was demolished by Willy, a goat we once had. Willy had a habit of chewing on almost anything he could find, including the delicate bark of young trees. Today, after poor Willy's demise, the sapling is thriving, its healed bark and stocky branches proudly declaring its birthright. So if there is a vacant space on your property, consider the Kentucky coffee tree. Think not only of its beauty, but of its undemanding nature. Its qualities make it a tree for the discriminating gardener, the lazy, and the merely practical.

Adelaide C. Rackemann is a Baltimore free-lancer and gardener who serves as librarian for the Cylburn Arboretum and with her husband, Frank, edits its newsletter.



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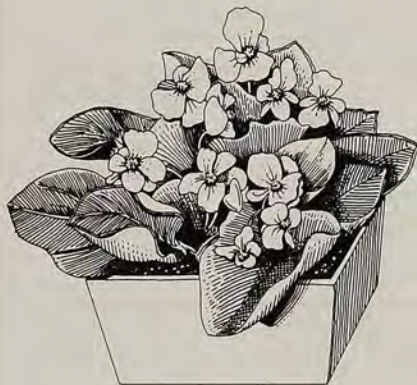
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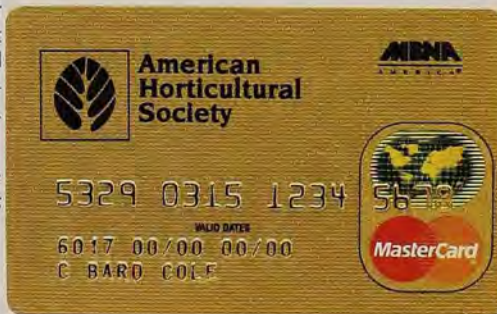
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Acer manchurium AY-ser man-CHUR-ee-um

A. triflorum A. try-FLOR-um

Amsonia am-SO-nee-uh

Baptisia bap-TIZ-ee-uh

Brochinea reducta broh-KIN-ee-uh reh-DUCK-tuh

Byblis gigantea BIB-liss jy-gan-TEE-uh

B. liniflora B. lie-nih-FLOR-uh

Caltha palustris KAL-thuh pah-LUS-triss

Catopsis berteroniana kah-TOP-siss

ber-ter-OWN-ee-ay-nuh

Caulophyllum thalictroides

kaw-low-FIL-lum thal-ik-TROY-deez

Cichorium sih-KOR-ee-um

Citrus atlantica SIT-triss at-LAN-tih-kuh

Darlingtonia californica

dar-ling-TONE-ee-uh kal-ih-FORN-ih-kuh

Dionaea muscipula die-oh-NEE-uh

mus-KIP-yew-luh

Disporum lanuginosum die-SPOR-um

lan-yew-jih-NO-sum

Dracula chimaera DRAK-yew-luh ky-MEER-uh

D. tubeana D. too-bee-AY-nuh

D. vampira D. vam-PIE-uh

Drosera filiformis DROS-er-uh fil-ih-FORM-iss

Drosophyllum lusitanicum dros-oh-FIL-um

loo-sih-TAN-ih-kum

Dryadella dry-uh-DEL-uh

Epidendrum vitellinum eh-pih-DEN-drum

vih-tel-LIE-num

Freycinetia fray-sih-NET-ee-uh

Gymnocladus dioica jim-NOK-luh-dus

die-oh-EE-kus

Impatiens wallerana im-PAY-shenz wal-er-AY-nuh

Iris prismatica EYE-riss priz-MAT-ih-kuh

Masdevallia pinocchio maz-dih-VAL-ee-uh

pin-OAK-kee-oh

M. triangularis M. try-ang-yew-LAIR-iss

Monarda moh-NAR-duh

Myoxanthus stonei my-oh-ZAN-thus

STONE-ee-eye

Nepenthes neh-PEN-theez

Phlox paniculata FLOKS pan-ik-yew-LAH-tuh

Pinguicula grandiflora pin-GWIK-yew-luh

gran-dih-FLOR-uh

Pleurothallis vorator plur-oh-THAL-iss vor-AY-ter

Rhododendron zolleri roh-doh-DEN-dron

ZOH-ler-eye

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S. purpurea S. per-PER-ee-uh

S. rubra S. ROO-bruh

Schlumbergera shlum-BER-ger-uh

Tephrosia teh-FROH-zee-uh

Trillium grandiflorum TRIL-ee-um

gran-dih-FLOR-um

Utricularia inflata yew-trik-yew-LAIR-ee-uh

in-FLAY-tuh

Zootrophion dayanum zoo-TROH-fee-on

day-AN-um

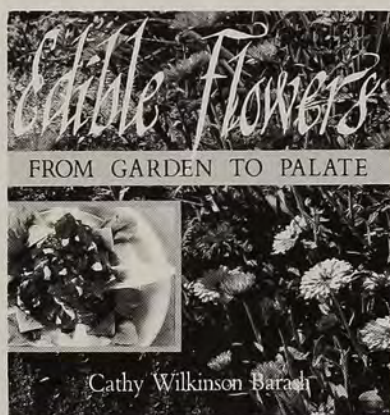
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FEBRUARY 13-20, 1994 GARDENS OF THE WINDWARD ISLANDS OF THE CARIBBEAN

Join us for an exploration voyage on board the *M/V Yorktown Clipper* from Antigua to Grenada. Ports of call include Guadeloupe,

Martinique, St. Lucia, St. Vincent, and the Grenadines, where we'll have a barbecue lunch on a quiet beach. This program has many unique highlights including the private riverside gardens of Madame Christiane Berthelot on Guadeloupe and the oceanside gardens of Jonathan and Marne Palmer at Ratho Mill on St. Vincent. In St. Vincent we'll also visit the oldest botanical garden in the western hemisphere and see a breadfruit tree grown from the original plant carried to the island by Captain Bligh in 1793. Leading the program for AHS is new AHS President Dr. H. Marc Cathey, his wife Mary, long-time AHS Board Member Andre Viette, and his wife Claire.

MARCH 2-19, 1994 GARDENS OF MOROCCO

With an itinerary that includes the magical cities of Casablanca, Fez, Marrakech, Essaouria, and Taroudant, this trip might be best described as a passage back through time into the land of Berber and Sudanese cultures. The program includes visits to the magnificent gardens and palaces created by Moulay Ismail. We'll stay at the exotic Palais Jamai in Fez and the world famous La Mamounia in Marrakech, where we'll also visit the Great Bazaar. March is an ideal time to visit Morocco since *Iris tingitana* and *Crotalaria saharae* promise to be in full bloom. Leading this program is AHS Board Member Katy Moss Warner, director of horticulture for Walt Disney World and a recognized expert on tropical horticulture.

Leonard Haentler Travel Company, 7922 Bonhomme Avenue, St. Louis, MO 63105,
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AHS members traveling to Santa Barbara, California, in November will tour Bud Baumes's garden. The hillside garden, which was designed by Isabelle C. Greene, overlooks Santa Barbara, Montecito, and the Channel Islands.

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