Two Thousand Years of Eating Bark: *Magnolia officinalis* var. *biloba* and *Eucommia ulmoides* in Traditional Chinese Medicine

Todd Forrest

With a sense of urgency inspired by the rapid disappearance of plant habitats, most researchers are focusing on tropical flora as the source of plant-based medicines. However, new medicines may also be developed from plants of the world's temperate regions.

While working in his garden in the spring of 1763, English clergyman Edward Stone was positive he had found a cure for malaria. Tasting the bark of a willow *(Salix alba)*, Stone noticed a bitter flavor similar to that of fever tree (*Cinchona* spp.), the Peruvian plant used to make quinine. He reported his discovery to the Royal Society in London, recommending that willow be tested as an inexpensive alternative to fever tree. Although experiments revealed that willow bark could not cure malaria, it did reduce some of the feverish symptoms of the disease. Based on these findings, Stone's simple taste test led to the development of a drug used every day around the world: willow bark was the first source of salicylic acid, from which Bayer chemist Felix Hoffman synthesized aspirin (acetylsalicylic acid) in 1899.

The recent search for new plant-based medicines has focused on tropical species, but aspirin is not the only drug derived from garden plants of the temperate zones: the antitumor agent taxol and the heart stimulant digitoxin come from plants found in front yards across North America. During random screening of plant material in 1980, the U.S. National Cancer Institute discovered taxol in the bark of the endangered Pacific yew *(Taxus brevifolia)*. Since then, chemists have developed a method for extracting the active compound from the needles of the English yew *(Taxus baccata)*, a species common in cultivation. Foxglove *(Digitalis purpurea)*, the source of digitoxin, had a long history as a folk medicine in England before 1775, when William Withering found it to be an effective cure for dropsy. Doctors now prescribe digitoxin as a treatment for congestive heart failure.

EGb 761, a compound extracted from the maidenhair tree *(Gingko biloba)*, is another example of a drug developed from a plant native to the North Temperate Zone. Used as an herbal remedy in China for centuries, ginkgo extract is now packaged and marketed in the West as a treatment for ailments ranging from short-term memory loss to impotence. Although the claims made for the extract might seem too miraculous to be true, research has shown that ginkgolides (the active ingredients in EGb 761) do have a beneficial effect on symptoms associated with aging.[1] Inspired by these results, pharmaceutical companies have established ginkgo plantations in Europe, China, and the United States.

Gingko is only one of many Chinese plants used as medicine. With an estimated 3,118 indigenous genera and more than 25,000 native species of seed plants, the flora of China is the largest and most diverse in the North Temperate Zone.[2] For thousands of years, practitioners of traditional Chinese medicine have developed treatments from plants, changed these treat-

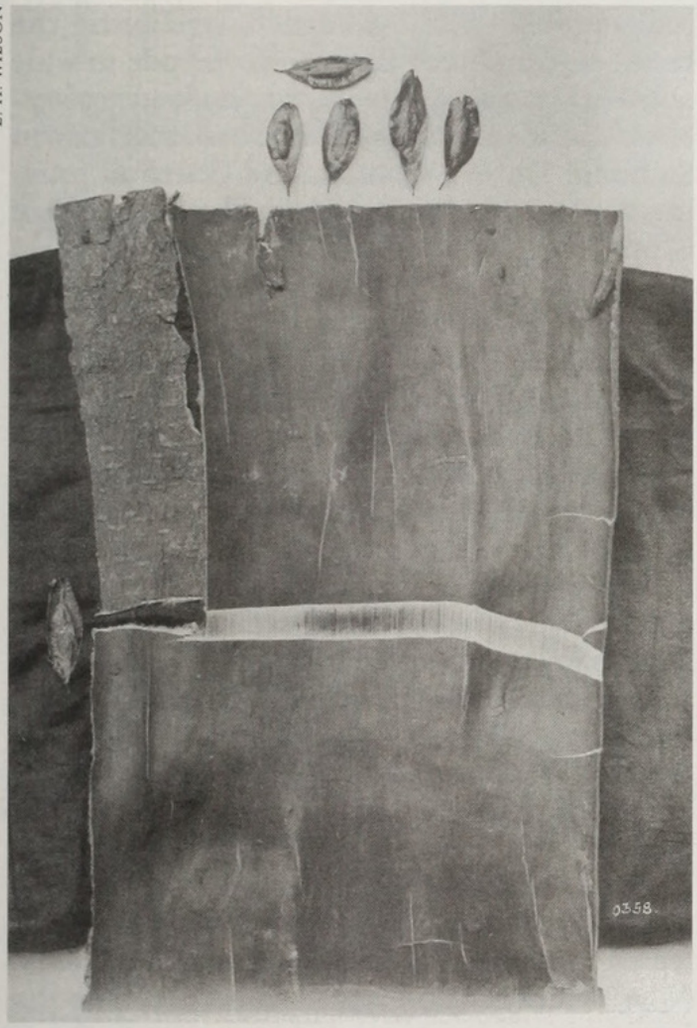
ments in response to empirical research and availability of raw materials, and documented their findings in herbals. Trade within China has enabled herbalists in Kunming to use the same plant materials as herbalists in Beijing, over a thousand miles away. Always searching for better cures, the Chinese have also looked to the rest of the world for useful plants: as early as the eighteenth century, the Chinese were importing American ginseng *(Panax quinquefolius)* from eastern North America to complement their own medicinal plants.

The documentation of traditional Chinese medicine goes back to the Han Dynasty (206 BC–220 AD). Written in approximately 100 BC, *Sheng Nong Ben Cao Chien* (The Herbal Classic of the Divine Plowman) is China's earliest known pharmacopoeia. This materia medica lists 365 traditional remedies, including 252 derived from plants, categorized into three classes based on toxicity: first-class remedies with no adverse side effects, used regularly to promote overall health; middle-class remedies, applied carefully to treat a smaller range of ailments; and lower-class remedies with potentially dangerous side effects, used to treat specific illnesses. *Sheng Nong Ben Cao Chien* gives general advice on the application of these remedies and specific instructions for their identification, preparation, and use.

Among the plants mentioned in this two-thousand-year-old work are joint fir *(Ephedra sinica)* and ginseng *(Panax ginseng)*, both of which have been appropriated by Western medicine. Joint fir is the source of ephedrine, an active ingredient in asthma and hay fever medicines. Ginseng, an important herbal medicine in China, is gaining popularity in the West as an adaptogen—a drug used to treat a variety of symptoms, to increase resistance to pathogens, and to promote general health. Research has shown that the active substances in ginseng

PETER DEL TREDICI

Eucommia ulmoides *in the Hangzhou Botanic Garden is elaborately sheathed to protect it from local bark harvesters. Even though most herbalists remove only part of the bark from a given tree, the popularity of the drug that is derived from* Eucommia ulmoides *makes every tree vulnerable to damage or even death from harvesting.*



The bark of Eucommia ulmoides *was photographed by E. H. Wilson in China in 1907. The white band of fibers in the middle of the slab is the latex that gives the tree its common name, the hardy rubber tree.*

stimulate nerve centers, improve the metabolism and vascular system, and lower cholesterol levels.[3]

While ginseng and ephedrine are familiar to many Westerners, some Chinese medicinal plants are essentially unknown outside China. Two of these plants, *Eucommia ulmoides* and *Magnolia officinalis* var. *biloba*, grow in the Arnold Arboretum. Many Chinese use soups, pills, teas, and tinctures made from dried eucommia leaves and bark to lower blood pressure and increase strength. Herbal practitioners prescribe magnolia bark to treat coughs and colds and use magnolia flower buds to improve digestion and ease menstrual cramps. Both species are uncommon in cultivation outside China but will grow in Boston gardens.

Eucommia ulmoides

A medium-sized, deciduous tree with lustrous, serrate leaves and inconspicuous, unisexual flowers, *Eucommia ulmoides* is the sole species in the Eucommiaceae. Native to the Tsinling Mountains in central China, eucommia was not seen by Western botanists until 1886, when specimens collected by Augustine Henry, a British customs official, trained medic, and amateur botanist, arrived at Kew Gardens. It was first grown in Europe in 1892, from seeds sent by French missionary Paul Farges to Maurice de Vilmorin, a Parisian plantsman. Its common name, the hardy rubber tree, refers to the white strands of latex found in its inner bark, leaves, and fruit. This latex attracted the attention of Europeans as early as 1903 when *The Gardener's Chronicle* claimed "there is good reason for believing that it would be worth while to plant [eucommia] in the warmer parts of the British Isles as a probable source of rubber."[4] Though the Chinese do produce some rubber from eucommia, it is not of high enough quality to be a replacement for the traditional, tropical source of rubber, *Hevea brasiliensis*.

The Chinese value eucommia more for its therapeutive properties than its latex. *Sheng Nong Ben Cao Chien* lists duzhong, the medicine derived from eucommia bark, in the first class of remedies, claiming it "revitalizes the internal organs, increases prowess, strengthens the bones, muscles, and tendons . . . and delays aging when taken continuously."[5] Augustine Henry found duzhong to be potent, telling William Watson of Kew Gardens that it is "tonic, invigorating, and . . . a most valuable drug with the Chinese, selling at 4s to 8s a pound."[6]

Farmers harvest eucommia in April, when the bark can be easily removed from the trunk of the tree. The process involves a number of steps. First, harvesters peel bark from trees with a diameter of greater than six inches, being careful not to girdle and kill the plants. They then tie the strips of bark together in bundles and sweat them under straw for a week or until the white inner bark turns black. Next, they lay the strips in the sun, drying the bundles so they can remove the outer bark, leaving only the stringy inner bark. They then chop the strips of inner

KAREN MADSEN

Magnolia officinalis *var.* biloba, *approximately twenty feet tall, in the Arnold Arboretum. This plant was grown from seed sent by the Hangzhou Botanic Gardens in 1981.*

bark into blocks and send them to market. Herbalists prepare these blocks according to a number of different recipes, depending on the needs of the patient.[7]

There are twelve accessions of eucommia represented in the collections of the Arnold Arboretum, including AA #14538-A, received as a plant from the Veitch Nursery Company of England in 1907. It is likely that this plant was grown from seed collected by E. H. Wilson in 1900 on his first trip to China for the Veitch firm. Almost ninety years old, this tree is now thirty feet tall with a spread of about twenty feet. Although no direct provenance information is available for this accession, Wilson's description of eucommia in *Plantae Wilsonianae* indicates that it is probably of garden origin. Wilson reported that he found no eucommia of indisputably wild provenance, apparently the result of overharvesting.[8] However, due to wide cultivation, the species is not in danger of extinction: farmers grow the tree in plantations in Sichuan, Hubei, Shaanxi, and Guizhou provinces, exporting the bark throughout the rest of China.

Magnolia officinalis

The Chinese also cultivate *Magnolia officinalis* for its medicinal properties. *The China Plant Red Data Book* lists this unusual magnolia, native to central China (Hubei, Sichuan, Guizhow, and Guangxi Provinces), as vulnerable, with most of its wild population destroyed by the over-harvesting of its valuable bark.[9] *Magnolia officinalis* is a fast-growing deciduous tree with large, obovate leaves and fragrant white flowers as large as twelve inches in diameter. In its native range, it occurs at elevations of nine hundred to six thousand feet, generally reaching a height of forty-five feet in full sun and well-drained soil.

This species has been plagued by taxonomic confusion since 1885, when it was first collected in Hubei Province by Augustine Henry. Nearly identical in appearance to *Magnolia hypoleuca*, a closely related Japanese species, it was identified as such until 1913, when E. H. Wilson and Alfred Rehder examined specimens Wilson had collected for the Arnold Arboretum in Hubei six years earlier. Rehder and Wilson gave the Chinese plant the species epithet *officinalis*, Latin for "of the shops," to signify its medicinal importance. They also named a variety, *Magnolia officinalis* var. *biloba*, distinguished from the type variety by the deep notches at the leaf apices and a slight variation in its native range (native to southeastern China—Hubei, Jiangxi, Zhejiang, Fujian, and Hunan Provinces). The bark of both is used as an herbal remedy.

In their description of *Magnolia officinalis* in *Plantae Wilsonianae*, Alfred Rehder and E. H. Wilson wrote, "the Chinese designate this species 'Houpo' tree, and its bark and flower buds constitute a valued drug which is exported in quantity from central and western China to all parts of the empire." *Sheng Nong Ben Cao Chien* lists houpo in the third class of remedies

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◊ an introductory packet with maps, information, the current issue of Arnoldia and a window decal

The Arnold Arboretum

SUMMER • NEWS • 1995

Albert W. Bussewitz, 1912–1995

Jim Gorman

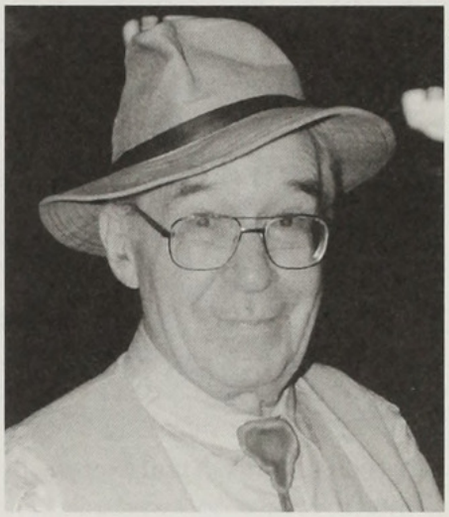
How rarely a man's love for nature becomes a ruling principle with him, like a youth's affection for a maiden, but more enduring! All nature is my bride. — Henry David Thoreau, April 23, 1857

Educator, naturalist, photographer, Albert W. Bussewitz, or "Buzzy," as he preferred, died this past August 8 of heart failure. The Arboretum's staff, volunteers, friends, and visitors will sorely miss his special warmth and quality of character as well as the encyclopedic knowledge of the natural world that he so readily shared with all. For the past seventeen years, Buzzy made the Arboretum his primary outdoor studio and classroom, developing many deep friendships. He had been a sanctuary director and educator for the Massachusetts Audubon Society for twenty-seven years before, as he used to say, he was "granted an honorable dismissal, having qualified chronologically."

In 1978 he and his wife, Flora Quirin, moved to Jamaica Plain—during the infamous February blizzard—and he "was recycled instead of retired." As the Arboretum's preeminent docent, Buzzy enthralled thousands of visitors as well as staff on his walks, which encompassed not just botany but the total natural environment. "Being a teacher," he said, "you share with others the opportunity to see what you're looking at—the petals of a plant, the plume of a bird—how one form relates to another. As a naturalist, I try to keep the doors open to show how one form of life connects to all others, as in a spider's web, where in touching one strand you touch the whole."

Buzzy loved words nearly as much as nature; he was our resident lexicologist. How he delighted in creating phrases with unexpected words. Richard Warren, longtime friend of both the Arboretum and Buzzy, observed, "He had a store of words and phrases that, while grammatical, were not usual. They could worry the listener in that an involved sentence might seem to have no ending, but he always crashed through with the most dramatic and grammatic word to save the day."

Born on a 160-acre farm in Juneau, Wisconsin, Buzzy's formative years exposed him to agriculture and the out-of-doors. He later would recall that he learned the songs of bobolinks, redwing blackbirds, and meadowlarks while walking the purebred Holsteins back home down a long country lane. "These walks also exposed me to the landscape," he said in a 1985 *Harvard Gazette* interview. "I remember a limestone quarry where salamanders lived under the rocks and where in spring I first got acquainted with the frogs and their sounds. I was, I suppose, the only one in Juneau with the audacity or maybe the courage to forage through the landscape with a butterfly net."



Susan Hardy Brown

A gathering in remembrance of Buzzy will be held Sunday, October 8, at 1 pm at the Hunnewell Building.

He graduated from Northwestern College in nearby Watertown, then entered Lutheran theological training, where he learned Greek and Latin. Later he would attend the University of Wisconsin, studying biology, entomology, and other natural history. His professor of wildlife management was Aldo Leopold, author of *A Sand County Almanac* and a founder of the Wilderness Society.

Soon after school, he came east, settling in Rochester, New York. A first job in the florist business was followed by work in the testing lab of Bausch and Lomb's precision optics department. It was in Rochester that his avocational affiliation with several natural history organizations began; he was a founder of the Genesee Ornithological Society and served as editor of their journal, *Goshawk.* He and

Flora would stay nine years in Rochester, and it was there that their three children, Robert, Betty Ann, and Barry, were born.

In 1949 he took the position of director of the Massachusetts Audubon Society's Moose Hill Sanctuary in Sharon, the oldest sanctuary within the oldest Audubon Society in the United States. Responsible for outdoor and classroom education and, in summer, for nature camps, he influenced scores of individuals in their decisions to pursue careers with an environmental focus. Later, when Stony Brook Sanctuary opened in Norfolk, he was asked to assume responsibility there. In 1966 he moved to Audubon's Rocky Knoll Nature Center in Milton and worked as natural history lecturer for sixth graders in many communities south of Boston. At his retirement Massachusetts Audubon Society's Allen Morgan praised him as "one of the true pioneers in environmental education."

Always photographing, Buzzy's vision was panoptic, taking in all parts of plants. Many of us were particularly struck by his skillful use of light, which revealed the translucency of fruits or the softness of tomentose leaves. His exquisite photography was often seen on the covers and pages of this and other publications. He was a longtime member, officer, and judge of the Boston Camera Club and its Nature Group. In 1980 he was named a Master Member of the New England Camera Club Council.

A member and past president of the Thoreau Society, Buzzy had carefully studied all of Thoreau's writings, especially the fourteen volumes of the *Journals,* and would often easily recite a passage to accentuate a moment with an audience. Of all the myriad programs, walks, and lectures Buzzy developed throughout his life, perhaps the most notable was "Through the Seasons with Thoreau." Combining excerpts from the *Journals* with his own interpretive images, this remarkable performance was Buzzy's magnum opus. First presented at Concord's Thoreau Lyceum in 1971, his "synergistic message," as he called it, was continually revised. "Doesn't have to be finished," he would say. "I keep it as an ongoing effort."

At the time of his death, he was returning from Carleton-Willard Village in Bedford, where he had presented "Through the Seasons with Thoreau." Flora, his beloved wife of fifty-five years, was at his side. One of the excerpts from Thoreau's journal for September 7, 1851, that he recited to that audience pertained to Buzzy as well:

> *How to extract its honey from the flower of the world, that is my everyday business. I am as busy as a bee about it; I ramble over all the fields on that errand and am never so happy as when I feel myself heavy with honey and wax. I am like a bee searching the lifelong day for the sweets of nature.*

To recall his tours and walks at the Arboretum is to remember fine performance art. We can think of no one who presented botanical information so colorfully and eloquently, interwoven with poetry, prose, and art as well as science. He was inspired and he inspired those with whom he came in contact, casual visitor or expert plantsperson. Often at the end of his tours he would remind you that it would take another lifetime or two to see the Arnold Arboretum, and even then you might miss something. Many of us know that because we knew Buzzy, we have seen much that we would otherwise have missed. We join the multitudes who are indebted to this noble, yet humble, poetic man, a special teacher who inspired us all.

Pamela Thompson Appointed Adult Education Coordinator

On August 1, Pam Thompson, former course registrar, took over as the new coordinator of Arboretum adult education. Over the past four years Pam has spoken with many of you over the phone as she has been responsible for

Karen Madsen

overseeing course registrations and many other aspects of the program. Prior to her work for the Arboretum, she served as Director of Administration for the Center for Plant Conservation.

Pam has a particular interest in creating programs that further utilize the living collections and that provide learning activities for families. She invites your sugges-

tions and comments as she plans courses for 1996 (617/524–1718 x 162). When not aranging classes at the Arboretum, Pam enjoys caring for her own garden as well as spending time with her six-month-old daughter, Ailsa Jeffries.

We also wish to send our congratulations to former program manager Marcia Mitchell, who has just entered a degree program at Harvard's Kennedy School of Government. Marcia's dedication and good humor will be sorely missed.

AA/NPS Forum

The Arboretum as a partner in the Olmsted Center for Landscape Preservation held a Forum on Vegetation Management for Historic Sites on August 3. An audience of over eighty maintenance managers, field personnel, and landscape preservation professionals attended. Topics included the application of principles of preservation to vegetation management, the management of mature specimen plants, and woody plant succession on historic sites.

Speakers included, in the back row, left to right, Bob Cook of the Arboretum, Charles Birnbaum of the National Park Service, David Barnett of Mt. Auburn Cemetery, Richard Harris of the University of California at Davis, Edward Toth of Prospect Park in Brooklyn, Phyllis Andersen of the Arboretum; center row, left to right, Lauren Meier and Nora Mitchell of the National Park Service, Lucy Tolmach of Filoli in Woodside, California; and front row,

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left to right, John Fitzpatrick of the Garden Conservancy, Peter Del Tredici of the Arboretum, Elizabeth Vizza of the Halvorson Company, Charlie Pepper of the National Park Service. Missing from the photograph are Glenn Dreyer of the Connecticut College Arboretum and Stephen McMahon of The Trustees of Reservations.

Summer Interns of 1995

1995's fifteen interns come from thirteen different institutions across the U.S. and from Ireland. From left to right in the outermost circle are Heather Storlazzi, Emma Ross, Niamh Page, Landry Lockett, John Creasey, Benjamin Zaitchik, and Scott Ritchie; inner circle, Brian Grubb, Crystal Lee, Angela Ingerle, Tanya Sandberg-Diment, Laura Brogna, Kristen Kleiman; front center left, Sonya Del Tredici, right, Jeremy Fink.

Each summer, the Horticultural Training Program brings students interested in horticulture, botany, or landscape design to the Arboretum for work and study. Work ranges from sharpening lawnmower blades and running chippers to pruning woody plants, transplanting trees, and computer-mapping the living collections. Study revolves around twice-weekly classes in plant identification, pests and diseases, weeds, pruning, planting and transplanting, taught by Arboretum staff. Assistant Superintendent of Grounds Julie

Karen Madsen

Coop, who supervises the program, leavens the mix with field trips. This year these included Mt. Auburn Cemetery in Cambridge, Ponkapoag Pond in Canton, Blithewold Arboretum and Newport estates in Rhode Island, as well as the rest of the Emerald Necklace, the Boston park system of which the Arboretum is a part.

Arboretum Hosts Wood Collectors Meeting

Chris Strand, Outreach Horticulturist

J. A. Kruza

Chris Strand, second from right, exchanges tree lore with members of the New England Chapter of the International Wood Collectors Society.

On June 24 the Arnold Arboretum hosted a meeting of the New England Chapter of the International Wood Collectors Society (IWCS). As the staff member responsible for coordinating this meeting I confess I was wary of their intent. The term "wood collectors," so prominent in the name of their organization, made me suspect that they would be asking questions like "How many board feet of lumber do you have at the Arboretum?" I was in for a pleasant surprise.

IWCS president Alan Curtis gave a slide presentation of his experiences at the Fairchild Tropical Garden, where he and other volunteers helped clean up in the aftermath of Hurricane Andrew, which literally destroyed the garden. As the garden's crews removed logs, Curtis and volunteers from the Wood-Mizer Company sawed them into boards. At a public sale later in the year they auctioned off 8,000 board feet of exotic lumber and raised $32,000 for the Garden.

After Curtis' lecture, Jim Gorman, Tour Coordinator at the Arboretum, and I led the group on a walking tour. We were able to share with them the botanical and horticultural qualities of the plants, and they shared with us the characteristics of the respective woods. For example, an IWCS member was able to explain why the wood of the princess tree *(Paulownia tomentosa)* is so highly valued in Japan, namely, for its use in special obi boxes. If the box is made correctly it will swell shut from the humidity in the season when the obi is not worn and will open in the season when it is worn. It is this property that makes the *Paulownia* wood so dear.

As the meeting continued into the afternoon with a lecture on the restoration of a savanna forest in South Africa, it had become clear that the wood collectors were, like all true aficionados, interested in many aspects of trees including their growth, unique qualities, and conservation.

Cynthia Buff

GCA Visits Boston

The national meeting of the Garden Club of America, held in Boston this past spring, provided several opportunities for Arboretum staff and GCA members to share knowledge about plants, horticulture, and preservation. Director Bob Cook spoke on the Arboretum's collaboration with the Olmsted Center for Historic Landscape Preservation, discussing the work of the Center and recent developments in the rapidly evolving preservation field. On Mother's Day, Arboretum staff hosted a GCA tour group, providing attendees with an excursion into the living collections and a plant recently introduced by the Arboretum, *Weigela subsessilis.*

Arboretum Open House, Saturday, October 14

Join Arboretum staff for a special open house welcoming the Friends of the Arnold Arboretum and the larger Boston community. Scheduled to run from 2:00 to 4:00 pm, the event will feature tours of the landscape, greenhouse, and Hunnewell Building and offer opportunities to chat with Director Bob Cook and other staff about Arboretum plans and programs. Please mark your calendars. We look forward to seeing you this October!

From *Landscape Gardening*, Samuel Parsons, Jr., 1900

Samuels Parsons, Jr: The Art of Landscape Architecture

Presented by the Frederick Law Olmsted National Historic Site and the Arnold Arboretum and sponsored by Wave Hill, The Bronx, the exhibition *Samuel Parsons, Jr: The Art of Landscape Architecture* will be on view in the Arboretum's Hunnewell Building, 125 Arborway, Jamaica Plain, from 1 October through 15 December 1995.

Charles A. Birnbaum, curator of the exhibit and coordinator of the National Park Service's Historic Landscape Initiative, will present a lecture on the work of Parsons on Thursday, 26 October, 7:30–8:30. It is free and open to the public. For reservations, please call 524–1718 x162. Samuel Parsons, Jr. (1844–1923), worked extensively in the design of parks for American cities, helping to define landscape architecture for the generation that followed Frederick Law Olmsted. The son of an accomplished horticulturist, Parsons received his initial training at Parsons & Sons Company Nursery. Later, Parsons served as Landscape Architect for New York City, where his innovative inner-city parks marked a new direction in American park design. The exhibit and lecture will trace the development of Parsons' career through his work for New York City as well as projects for San Diego, Washington, DC, and other cities across the country.

New Staff at the Arboretum

Kirsten Ganshaw, a 1994 summer intern, has returned to the Arboretum as a member of the grounds staff. She is responsible for the seven-acre Bradley Garden

Karen Madsen

of Rosaceous Plants where her work includes pruning, transplanting, weeding, mulching, updating the plant records in the computer database, and overseeing interns as they rotate through the garden as part of their summer experience. She is presently working to contain the erosion and weeds that plague Dawson Pond.

Kit brings to her job fifteen years' experience in landscape gardening. She's been senior gardener at a public botanic garden; landscape supervisor on an estate garden; a contractor specializing in water gardens; and crew supervisor in many situations. She holds a BS in natural resource management and applied ecology from Cook College, Rutgers State University, where she worked as greenhouse technician in the Department of Entomology.

Andrew Hubble has joined the Arboretum to serve as curator of computers. His official title is Network Systems Manager; as such he will ensure that our PC and Macintosh computers are able to talk to our UNIX and Novell

Karen Madsen

servers. He also provides technical support to Arboretum and Herbarium staff in Jamaica Plain and in Cambridge, especially in connection with the Asian biodiversity project, community science education programs, and the living collections database.

Moreover, he is responsible for planning and developing initiatives in Internet access, a World Wide Web home page, and visitor center computer kiosks.

Andrew has worked in information technology for the last fifteen years in the fields of biotechnology, library automation, and academic research. He is a graduate of the University of California at Davis with a BS in plant science.

Karen Madsen

Deby Pasternak is the newest addition to the Arboretum's Development Office. She has worked in development at the Berklee College of Music and at the Harvard Business School. She also has experience in environmental education in the photovoltaics industry and as a volunteer science teacher on the Hudson River Sloop Clearwater.

Deby helps to organize events, researches funding sources for the Arboretum's many environmental and educational programs, and provides invaluable support to the development staff as the Arboretum embarks on its first campaign since the Charles Sprague Memorial Campaign of 1927. A graduate of Amherst College, Deby is also a performing and recording musician.

Have You Finished Reading 54:1?

The Spring 1994 issue of *Arnoldia*—volume 54, number 1: the one with the statuesque Lombardy poplars on the cover—has been in especially heavy demand. We ran out of copies many months ago, and still the requests come in. We're especially concerned about the missing-issue claims from horticultural and botanical libraries, where the lack of 54:1 will interrupt complete collections.

If you've finished reading 54:1 and have no further need of it, would you consider returning it to the Arboretum for redistribution? We'd be very grateful.

PROGRAMS & EVENTS

The Arboretum's Education Department offers a wide variety of courses, programs, and lectures in horticulture, botany, and landscape design. A selection of fall courses is shown here. For a complete catalog of programs and events at the Arboretum, please call 617/524-1718 x 162. Note that fees shown in **boldface** are for members of the Arboretum. For information about becoming a member, call 617/524-1718 x 165.

SEPTEMBER/OCTOBER

BOT 224 The Mosses of New England

Benito Tan, Bryologist, Harvard University Herbaria

Join Dr. Benito Tan to learn about New England mosses in the field and in the laboratory. This course will focus on moss species that are common and biologically unique to New England. The class will visit a site rich in mosses where the instructor will supervise the limited collection of moss samples for study in the laboratory. Most class time will be spent in learning to recognize moss species with a hand lens and under the microscope. Discussion will touch only briefly on the horticultural use of mosses. Equipment needed: 7x or 10x field lens and a small pocket knife for collecting.

Fee: $85, $100
5 Wednesdays, September 27, October 4, 11, 18, 25/ 6:00–8:00 pm (HUH) and 1 Sunday field trip, October 1 (TBA)

HOR 419 The Year-End Garden: Plants for the Fall and Winter

Gary Koller, Senior Horticulturist, Arnold Arboretum

Learn the palette of plant material, both herbaceous and woody, that provides interest in the garden as the year wanes and the weather turns cold. At the first class meeting, we will discuss the fall possibilities for flowers and foliage color, especially the plants for late fall. Weather permitting, we will visit the Case Estates teaching garden, which peaks in fall.

Fee: $30, $35
2 Wednesdays, October 18, 25/ 5:00–7:00 pm (CE)

HOR 450 Looking at Plants with Michael Dirr

Michael Dirr, Professor of Horticulture, University of Georgia

Dr. Michael Dirr, world authority on woody plants and author of the standard reference work *Manual of Woody Landscape Plants,* will make one of his rare speaking trips to Boston this fall. Dr. Dirr's many friends and students know that early registration is needed to ensure that they will hear his latest information about newly introduced plants and new cultivar availability.

Fee: $15, $18
Friday, October 20/ 7:00–8:30 pm (HB)

NOVEMBER

HOR 246 The Plant Connoisseur: Annuals and Half-Hardy Perennials

Brian McGowan, Owner, Blue Meadow Nursery, Montague Center, MA

Many desirable garden plants that are perennial in warmer climates are not used in New England gardens because they cannot survive our winters. Brian McGowan specializes in growing these plants, and his talk provides the information necessary to overwinter tender perennials and even some annuals. His slide presentation introduces some of the hundreds of new annuals and tender perennials now being grown for the home gardener.

Fee: $12, $15
Wednesday, November 8/ 7:00–8:30 pm (CE)

WAL 339 Plant Interactions: Vegetation Dynamics of Southern New England

William A. Niering, Professor of Botany, Connecticut College, and Editor, Restoration Ecology

Well-known plant ecologist William A. Niering, author of *The Audubon Society Field Guide to North American Wildflowers,* will speak on plant interactions in upland and wetland regions of southern New England. Competition among these plants largely determines their success in different habitats. Knowledge of changing conditions, and how plants affect each other under these changing conditions, is important to understanding future patterns of plant growth.

Fee: $8, $10
Thursday, November 2/ 7:00–8:30 pm (HB)

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The spectacular foliage of Magnolia officinalis *var.* biloba.

because its active ingredient, the alkaloid magnocurarine, is toxic in high concentrations. The Chinese, Wilson observed, use it as "a cure for coughs and colds, and as a tonic and stimulant during convalescence."[10] More recently, the Harvard botanist Lily Perry described the drug extracted from the bark as "bitter, pungent, and warming" and said it is prescribed for "flatulence, nausea, lack of appetite, shortness of breath, and dysentery."[11] The dried flower buds, called Yu-po, are used to treat intestinal problems, and are "esteemed as a medicine for women."[12]

Harvesters do not show the same concern for magnolia when removing its bark as they do when harvesting eucommia. In May they cut down twenty-year-old trees and strip the bark from the roots, trunks, and branches. After drying the bark, first in shade and then in sun, the harvesters steam it, roll it into tubes, and sort it according to the part of the tree from which it comes: tube houpo, from the trunk; boot houpo, the irregular remnants of tube houpo; root houpo, also known as "chicken intestine po"; and branch houpo. Since houpo is toxic in large doses, it is never given to pregnant women and always prescribed with other herbs. Herbalists decoct the bark and use the extract in mixtures with rhubarb, licorice, ginger, or other herbs to make teas, powders, and tinctures.

Magnolia officinalis has not performed well in the Arnold Arboretum, but its variety *biloba* has thrived. Not available outside China until 1936, this interesting plant, like eucommia, grows mostly in botanic gardens and arboreta. Seeds obtained by the Arnold Arboretum from the Hangzhou Botanic Garden in 1981 (AA #398–81) have already grown into plants twenty feet tall. Like *M. fraseri* and *M. macrophylla*, both native to North America, its leaves are

arranged in false whorls at the ends of its branches, giving the plant an open, tropical appearance. The combination of these eighteen-inch-long, notched leaves, light gray bark, and large, fragrant flowers make this a striking ornamental tree. Although *M. officinalis* var. *biloba* is not yet used medicinally in North America, its exotic habit and foliage have made it a popular plant for zoo horticulture—curators use it to create tropical exhibits for zoos in temperate climates.

Western chemists have examined both *Eucommia ulmoides* and *Magnolia officinalis* and isolated active compounds from their bark. Tests done at the University of Wisconsin support the claim that duzhong has potential as an antihypertensive drug.[13] Magnocurarine, the alkaloid in houpo has "a neuromuscular blocking effect and cause[s] relaxation of the skeletal muscles."[14] Pharmaceutical companies have not developed these compounds for use in North America because there are already similar drugs on the market.

With a sense of urgency inspired by the rapid disappearance of plant habitats, most researchers are focusing on the diverse flora of the tropics as the source of plant-based medicines. However, as drugs such as taxol and EGb 761 demonstrate, new medicines may also be developed from plants of the temperate regions of the world. Of these regions, China offers the highest floristic diversity and a more than two-thousand-year-old tradition of using plants as medicines. This long history of herbal medicine has already proven valuable to Western medicine and may do so again in the future.

Todd Forrest came to the Arnold Arboretum as an intern in 1994 and now maintains the plant records system for the institution.

Endnotes

[1] F. V. DeFeudis, Ginkgo Biloba *Extract (EGb 761): Pharmacological Activities and Clinical Applications* (Paris: Elsevier Press, 1991).

[2] T. S. Ying, Y. L. Zhang, and D. E. Boufford, *The Endemic Genera of Seed Plants of China* (Beijing: Science Press, 1993), i.

[3] K. C. Huang, *The Pharmacology of Chinese Herbs* (Boca Raton, FL: CRC Press, Inc., 1993), 21–45.

[4] William Watson, "A Hardy Rubber-Yielding Tree," *The Gardener's Chronicle* (1903) 842: 104.

[5] Quoted from *Sheng Nong Ben Cao Chien* by Shiu-ying Hu in "A Contribution to Our Knowledge of Tu-chung—*Eucommia ulmoides*," *American Journal of Chinese Medicine* (1979) 1: 6.

[6] Augustine Henry quoted in William Watson, op. cit. An excellent reference for Henry's travels in China is his own *Notes on Economic Botany of China* (1893; reprint, Kilkenny, Ireland: Boethius Press, 1986).

[7] Dr. Shiu-ying Hu is an invaluable source of information on all Chinese medicinal plants. She translated the sections of the *Sheng Nong Ben Cao Chien* dealing with *Eucommia ulmoides* and *Magnolia officinalis* for me and kindly pointed me towards many other sources.

[8] A. Rehder and E. H. Wilson, *Plantae Wilsonianae*, vol. I, ed. C. S. Sargent (Cambridge: Harvard University Press, 1913), 433.

[9] *China Plant Red Data Book—Rare and Endangered Plants*, vol. I, ed. L. K. Fu and J. M. Jin (Beijing: Science Press, 1992), 416–417.

[10] Rehder and Wilson, op. cit., 392.

[11] L. M. Perry, *Medicinal Plants of East and Southeast Asia* (Cambridge: MIT Press, 1980), 250.

[12] Rehder and Wilson, op. cit., 392.

[13] Hu, op. cit., 27–28.

[14] Huang, op. cit., 174.