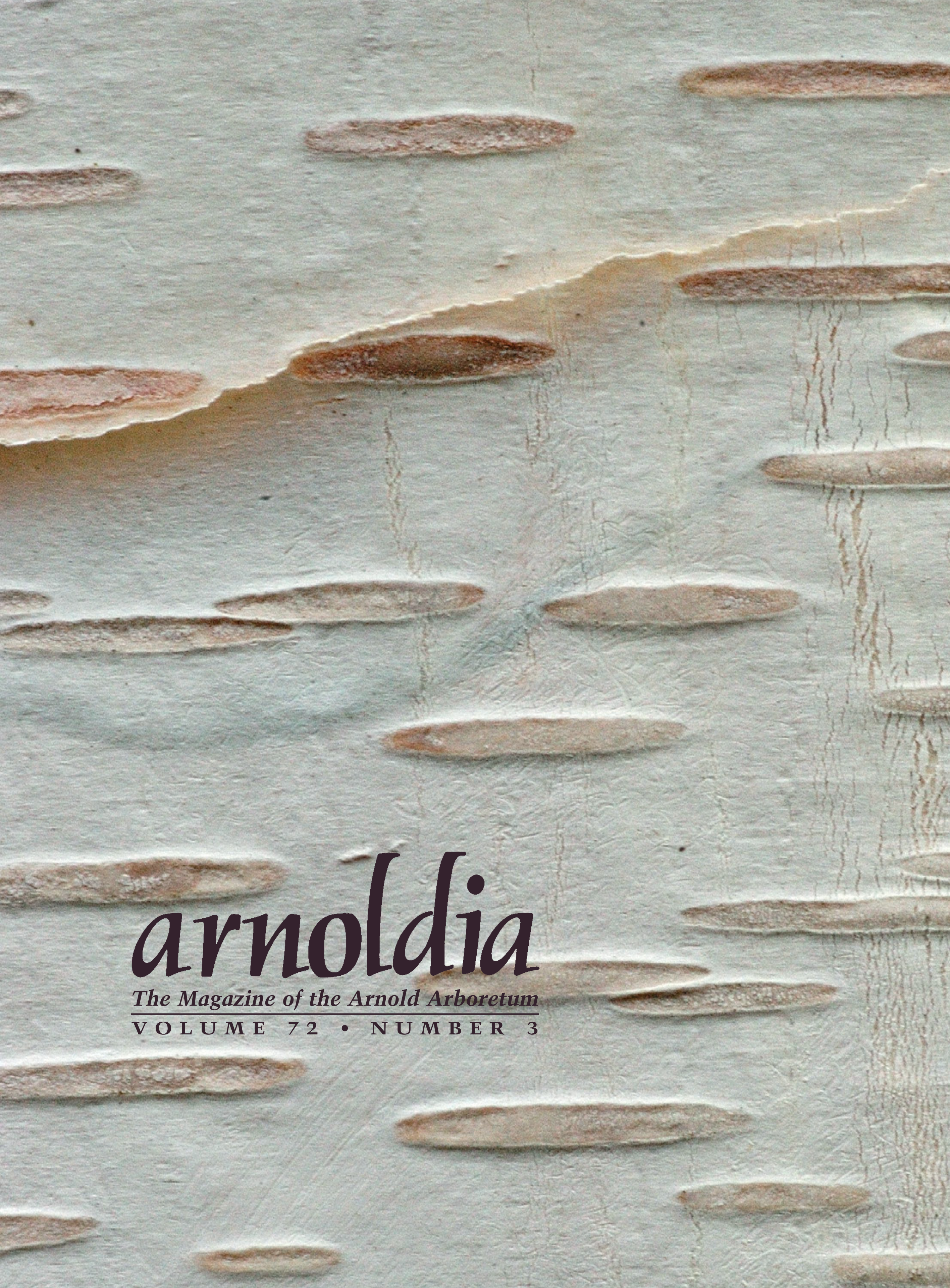

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The Magazine of the Arnold Arboretum

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The ARNOLD ARBORETUM of HARVARD UNIVERSITY

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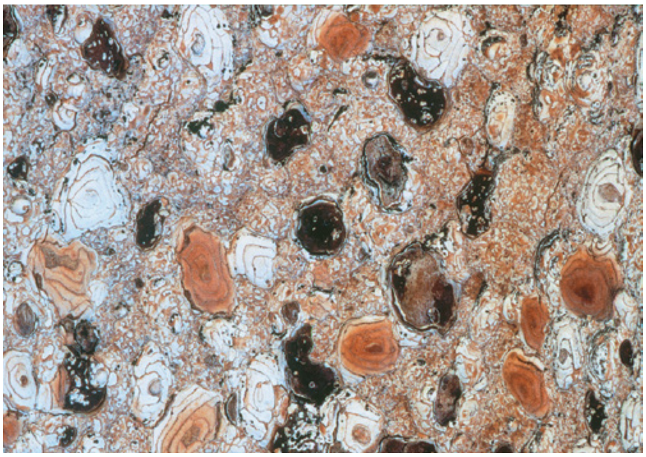
Front cover: The bark of paper birch (*Betula papyrifera*) shows the prominent horizontal lenticels characteristic of many birch species. Photo by Paul and Eva Begley.

Inside front cover: A coalition of local parks organizations, including the Arboretum, worked with the Boston Parks Department to establish the Boston Park Rangers program in 1982. The program was based on the New York City Urban Park Rangers program, established in 1979; this slide of a New York City ranger was likely used in presentations aimed at rallying community support for the Boston program. Archives of the Arnold Arboretum.

Inside back cover: Native to the Mediterranean region, Montpellier maple (*Acer monspessulanum*) is noted for its small, leathery leaves and brightly colored samaras. Photo courtesy of Paulo Rocha Monteiro.

Back cover: The unique bark of cork oak (*Quercus suber*) is used to make cork stoppers, flooring, and other products. Photo courtesy of Amorim.

In the fading light of dusk, satiny bark curls on a greenleaf manzanita (*Arctostaphylos patula*) take on a purplish sheen.



The bark of whitebark pine (*Pinus albicaulis*) is much finer-textured than that of most pines and resembles an extreme close-up of an impressionist painting.

The trunks of giant sequoias (*Sequoiadendron giganteum*) are protected by thick layers of fibrous, fire-resistant bark.

Bark: From Abstract Art to Aspirin

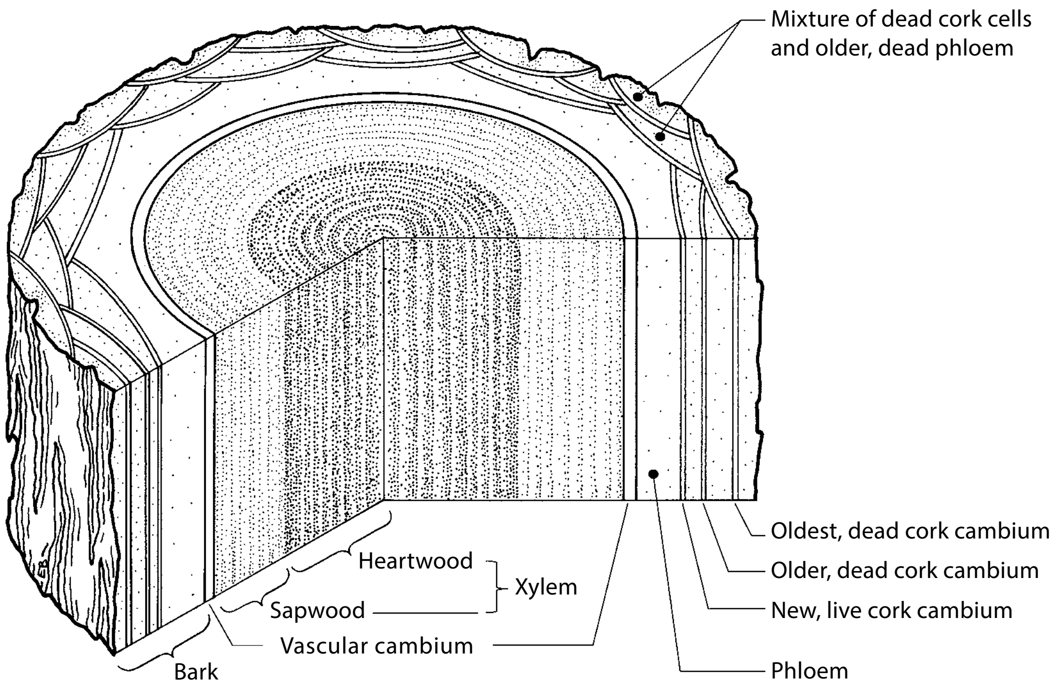
Eva Begley

To many people, bark is just the gray or brown stuff that covers tree trunks, but it's actually much more interesting than that. Woody dicotyledons and gymnosperms depend on their bark to keep insects and pathogens out. Bark also minimizes evaporation of water from trunks and branches. The fire-resistant bark of giant sequoia (*Sequoiadendron giganteum*) grows up to 18 inches [45.7 centimeters] thick and has allowed some individuals to thrive for more than 3,000 years. Cork oak (*Quercus suber*), native to southwestern Europe and northwestern Africa, can also survive forest fires thanks to its thick bark.

While functional for the tree, bark can be aesthetically pleasing for us. The bark of some trees shows surprising colors, including green, blue, and orange. It can be rough or smooth, stringy or flaky; it can peel away in long shreds or curl like chocolate shavings on an elaborate gateau. The textures and patterns in bark may remind you of abstract painting or sculpture, jigsaw puzzle pieces, or an old cable-knit sweater. Bark's charms are sometimes accentuated when festooned with lichens or providing a foothold for epiphytes.

Anatomy of a Tree

As a tree grows taller and adds more leaves and branches, its weight increases. To support the added weight, the trunk and branches grow in diameter. They do that thanks to a sleeve of almost-forever-young cells called the vascular cambium. During the growing season, these cells divide many times, mainly in a plane parallel to the surface of the trunk or branch. Cells produced on the inner side of the vascular cambium become xylem, which, as so-called sapwood, conducts water and minerals absorbed by the roots to the rest of the tree, then turns into the strong woody core of the tree—the heartwood, which is usually darker in color



What Is Bark?

Botanists usually use the term "bark" to refer to everything outside the vascular cambium: phloem; phloem fibers; the innermost, live cork cambium and all its inner and outer derivatives; and older, dead cork cambia along with whatever else has accumulated outside the live cork cambium. The cork cambium and its products (that is, phellem and phelloderm) are collectively referred to as "periderm." The live, deeper-seated components of the bark are sometimes called "inner bark."

than the sapwood. Cells produced on the outer side of the vascular cambium become phloem, which conducts sugars and other carbon-based nutrients throughout the tree. In temperate climates, the xylem and phloem formed early in each growing season usually contain lots of relatively large cells; cells formed later in the growing season are smaller. As a result, the xylem and phloem are built up of concentric rings, each ring constituting one year's growth. Phloem rarely lasts more than a few years (more on that in a moment). Xylem, however, can last well beyond the life of the tree in the form of standing snags or downed wood, or as lumber in buildings and furniture. Similar processes take place in roots.

Once in a while, to keep up with the increasing girth of the tree, the cells of the vascular cambium divide in a radial plane. The phloem and most other cells outside the vascular cambium, though, have matured and aren't able to keep dividing or enlarging—they get stretched to the breaking point. That triggers the development of a new layer of squat, dividing cells, the cork cambium or phellogen, usually near the stem's surface. Like the cells of the vascular cambium, those of the cork cambium divide mainly in a plane parallel to the surface. (Interestingly, the cork cambium isn't necessarily active at the same time as the vascular cambium—the cork cambium seems to function more on an as-needed basis, perhaps in response

Front and side views of the bark of sugar pine (*Pinus lambertiana*). The crevices are deep enough to peer into and see the longitudinal arrangement of the bark plates formed by successive cork cambia.

to the damage caused by stretching and rupturing of cells around the perimeter of the trunk or branch.) The relatively few new cells formed on the *inner* side of the cork cambium, collectively called the phelloderm, usually stay fairly unspecialized; they may separate a bit, allowing some air circulation between them, and in some species they become photosynthetic, coloring the bark green. Far more new cells are produced on the *outer* side of the cork cambium; but except in a few aquatic or wetland plants, they stay tightly packed, with no air spaces between them. Unlike animal cells, each plant cell is enclosed by a wall composed primarily of cellulose. As the cell matures, its wall may be reinforced by additional layers of cellulose, or, in most cells in the xylem, by a strong, rigid substance called lignin. In the outer derivatives of the cork cambium, the cellulosic wall is lined by layers of a waterproof substance, suberin, sometimes alternating with sheets of waxes or lignin. Eventually, these outer derivatives die and their interiors become tiny gas-filled pockets, giving them a squishy feel: they have become phellem, commonly called cork.

Of course that isn't the end of the story, because in the meantime the vascular cambium continues increasing the plant's girth. Eventually, that first layer of cork also gets stretched excessively and starts to crack. In cork oak, occasional cell divisions in a radial plane allow the cork cambium to keep pace with the growth in girth, but more commonly the first-formed cork cambium dies and new cork cambium forms deeper in the trunk or branch, sometimes even in the outer, older part of the phloem. In some species, each new cork cambium forms a complete sleeve; other species produce many small, overlapping patches of cork cambium, a bit like curling shingles on an old roof. Often, these later cork cambia are initiated right underneath cracks in the tree's surface, like internal bandages, ensuring that no crack gets deep enough to damage the living interior of the tree. This process is repeated over and over throughout the life of the plant. Eventually, a complex structure is formed, with everything outside the innermost, most recently formed cork cambium either dead or dying.

Bark Variations

The texture of the bark depends largely on the shape and location of successive cork cambia and on the types of cells "trapped" between them. Chinese or lacebark elm (*Ulmus parvifolia*), for example, has many overlapping, irregularly shaped cork cambia fairly close to the surface. Trees with deeper-seated cork cambia have rougher, craggier bark, like northern red oak (*Quercus rubra*) and tulip tree (*Liriodendron tulipifera*). Layers of thin-walled cells, whether the inner derivatives of the cork cambium or part of the phloem, are structurally weak, so bark characterized by such layers is likely to flake or peel off easily. Phloem sometimes contains lots of long, skinny, thick-walled but pliable cells, called fibers; as old phloem gets incorporated into the bark, these fibers give it a stringy texture. In some pines, the outer derivatives of the cork cambium consist of alternating bands of suberized cork cells

The bark of lacebark elm (*Ulmus parvifolia*) has a jigsaw-puzzle-like pattern.

This Garry oak, also known as Oregon white oak (*Quercus garrayana*), has deeply creviced bark.

The bright green bark of palo verde (*Cercidium floridum*), a member of the legume family (Fabaceae), can be quite variably patterned; this particular tree shows kite-like shapes.

River birch (*Betula nigra*) is admired for its multicolored, dramatically peeling bark. Close examination reveals that each papery sheet is covered with the long transverse lenticels often found in the genus.

and short, heavily lignified cells, called stone cells, that harden the bark.

Layers of dead, waterproof cells are fine for protecting trees from bugs, desiccation, and other dangers, but they also hinder gas exchange. Like most living things, the live cells inside trunks and branches, including those of the vascular cambium and phloem, need oxygen. Lenticels provide the solution. They are small patches of loosely packed cells with lots of air spaces between them that the cork cambium produces here and there instead of dense arrays of cork cells. In some species, the lenticels are hidden at the bottom of cracks in the bark; in others, such as paper birch (*Betula papyrifera*), they form a prominent and characteristic part of the bark's appearance. Gases diffuse in and out through the lenticel's air spaces, allowing the live interior parts of the trunk to "breathe." Also, any green, chlorophyll-containing cells in the bark produce oxygen as a byproduct of photosynthesis. That oxygen gets snapped up by nearby, live, non-photosynthetic cells, which give off carbon dioxide, which their photosynthetic neighbors then use to produce more sugars—as neat a solution as any recycling system devised by engineers.

Different species of the same genus can have very different bark colors and patterns. Take the birches, for example. Sweet birch (*B. lenta*) has rather ordinary-looking gray bark, but paper birch and European white birch (*Betula pendula*) have smooth white bark with long, transverse lenticels. The lenticels of western water birch (*B. occidentalis*) form a similar pattern against a beautifully shiny, pinkish brown background, while in yellow birch (*B. alleghaniensis*) the background is yellowish brown or dark gray. River birch (*B. nigra*) is often grown for the tan, reddish brown, and dark gray sheets of bark that peel off its trunk in shaggy disarray. The maples are even more varied. Many have bark that is plain gray in color, albeit with various textures. But then there's the aptly named paperbark maple (*Acer griseum*) with peeling sheets of cinnamon colored bark, Father David's maple (*A. davidii*) with its characteristic vertical white squiggles on a bright green background, and coral bark maple (*A. palmatum* 'Sango-kaku'), a Japanese maple that adds color to winter gardens with its brilliant red branches.

Bark's appearance often changes with age, and it's common for the bark of twigs and young branches to differ from that of older limbs. An extreme example is European white birch, in which the rough, gray to almost black bark near the base of the trunk forms a stark contrast to the creamy white bark higher up. And in aspen (*Populus tremuloides*), wherever the trunk has been wounded, be it by fungal attack, natural abscission of the lower branches as the tree gets taller, a bear climbing the tree, or lonely sheepherders or bored teenagers carving their names into the tree, the bark becomes black and fissured, very different from the tree's normally smooth, pale bark.

Bark Beneficiaries

Thick bark has some obvious benefits to trees, but the cracks and fissures in that bark can also provide good habitat for other species. Especially on rough-barked trees, enough soil, organic debris, and moisture can collect to fill minute pockets in which lichens, mosses, and larger epiphytes such as ferns and orchids can get a toehold. Often, different species of lichens and mosses grow on the upper and lower surfaces of leaning tree trunks and large limbs.

NANCY ROSE

Younger branches of coral bark maple (*Acer palmatum* 'Sango-kaku') are bright red.

Black bears have left permanent calling cards on the trunks of this quaking aspens (*Populus tremuloides*).

The bark on the upper part of these old red fir (*Abies magnifica*) trunks is almost hidden by wolf lichen (*Letharia* spp.); the lichens don't grow below the average snow line in the grove.

Some mosses and lichens may prefer certain species of trees; for example, in the northern Sierra Nevada mountains, wolf lichen (*Letharia* spp.) usually seems to grow more luxuriantly on the trunks of red fir (*Abies magnifica*) and incense cedar (*Calocedrus decurrens*) than on the trunks of nearby seemingly equally rough-barked pines, though, the pines' *branches* sometimes bear dense chartreuse masses of this lichen.

Insects use the cracks and fissures in bark as places to hide; some feed on bark; others lay their eggs on or under the bark of dead or dying trees or trees stressed by drought. Collectively, these insects and their larvae provide a smorgasbord for insectivorous birds such as nuthatches, creepers, and woodpeckers. Sapsuckers (*Sphyrapicus* spp.), also members of the woodpecker family, drill horizontal rows of holes into the trunks of favorite tree species to feed on the nutritious inner bark and the sap that oozes out, along with insects caught in the flow. Subsequently, other woodpeckers, orioles, hummingbirds, warblers, and even some insects and mammals feed at these "sapsucker wells."

Nuthatches (*Sitta* spp.), gray jays (*Perisoreus canadensis*), and some species of woodpeckers cache nuts, seeds, and even dead insects by thrusting them into bark crevices, but acorn woodpeckers (*Melanerpes formicivorus*), native to the western United States and parts of Mexico, have raised the art of food storage to a new level. These social birds typically live in families of two to a dozen or more animals, and each family creates a communal acorn larder in the bark of thick-barked living trees, the bark or wood of standing snags, and even utility poles and fence posts. Acorns are stored in individual cubbyholes, each of which takes a total of about an hour to make although it's rarely finished in one sitting; typically, family members take turns drilling it over a period of a few days. A "granary tree" may have anywhere

Sapsuckers drilled multiple rows of holes in this white alder (*Alnus rhombifolia*). Extensive sapsucker drilling may partially girdle trees, which can eventually lead to the tree's decline.

Acorn woodpeckers constructed a granary in this valley oak (*Quercus lobata*). The tree is now dead, but the presence of a few remaining slabs of bark full of the distinctive holes indicates that the birds started their work while the tree was still alive or at least still had bark on it.

from one or two thousand to tens of thousands of acorn-sized cubbies, and each year the birds drill many more holes to replace those lost as limbs break off and old trees fall. In fall, the birds harvest ripe acorns from the branches of nearby oak trees (they rarely collect acorns that have already fallen to the ground), pry off the caps, and hammer the acorns into the predrilled holes. The flat end of the acorn, which provides a better surface for hammering, is almost always on the outside. If the first hole is too large or too small, the bird will try other holes until it finds one that is just the right size for a snug fit. The acorns provide an important food source for the family throughout the winter and early spring. Contrary to earlier belief, it seems that the birds feed directly on the acorns, not just on the insect larvae that sometimes infest them.

Some mammals feed directly on bark. Porcupines and snowshoe hares like conifer bark. Moose will eat bark in winter if nothing more to their liking is available. Beavers, on the other hand, love bark, especially aspen (which is abominably bitter to human taste buds), but also other *Populus* species, willows (*Salix* spp.), birch, red-osier dogwood (*Cornus sericea*), and other species. I've even seen conifers (specifically, lodgepole pine, *Pinus contorta* subsp. *murrayana*) felled by beavers. During the growing season, the animals eat the buds, leaves, and twigs of these plants as well as the bark. In winter, bark is their primary food. Since beavers can't climb trees to reach the goodies up in the canopy, their solution is to gnaw down the entire tree. They are amazingly efficient at this: I once watched a beaver scramble out of an Ozark river and up a steep bank to a young

Acorn woodpeckers drilled holes for various acorn sizes in this blue oak (*Quercus douglasii*).

maple, with a trunk diameter of maybe 4 to 5 inches (10 to 13 centimeters). Within moments the tree's crown was swaying wildly, and in less than five minutes the beaver had dragged the entire tree through thick undergrowth back into the water and was swimming away with it. The animals don't waste much: debarked trunks and branches are used to construct or reinforce the beavers' lodges and the dams that they are famous (or notorious, depending on your point of view) for building. And wherever winters are typically cold enough for ponds to freeze over, beaver families cache enough young branches each fall to last them through the winter, usually by jamming the butt ends deep into the mud at the bottom of the pond, sometimes by building floating rafts, placing already peeled logs and less-preferred foods such as alder on top of the raft and favorites like aspen and willow below so that the branches are easily accessible from underwater.

Canoes, Quinine, and Corks

Bark benefits people too. Leafing through Daniel Moerman's encyclopedic *Native American Ethnobotany*, I get the impression that Native Americans found the bark of just about every native tree species useful in some way, be it medicinally or to make baskets and other containers, rope, cloth, dyes, and many more items. In winter, the Lakota, Blackfoot, and Cheyenne fed their horses with cottonwood and aspen bark. Some tribes used slabs of bark as roofing material. In the upper Midwest the Ojibwe (also known as the Chippewa) stitched sheets of paper birch bark together with spruce roots

Beavers leave tell-tale signs wherever they fell trees.

The bark of cork oak (*Quercus suber*) is carefully hand-harvested. The bark regrows and can be harvested again in about ten years.

to waterproof their homes. In fact, so versatile is the bark of paper birch that it was used for everything from canoes to kitchen funnels; as Moerman puts it, "Nearly any kitchen utensil common to the white man could be duplicated in birch bark by the Ojibwe."

The homes and barns of North America's European settlers were often roofed with the bark of American chestnut (*Castanea dentata*). Some of those buildings might have been painted using brushes made by boiling basswood (*Tilia americana*) bark in lye, then pounding it to extract its hemp-like fibers, a technique the settlers learned from Native Americans who made rope, sewing thread, and woven bags from basswood bark. The settlers probably wore shoes made of leather processed with tannins extracted from hemlock or oak bark, and some of their clothes may have been dyed with quercitron, derived from the yellow-orange inner bark of the black oak (*Quercus velutina*). Alone or in combination with mordants or other dyes, quercitron can yield colors ranging from bright yellow to warm browns. It was used commercially until well into the twentieth century, when cheaper synthetic dyes were discovered.

Human health has also benefitted from certain chemical compounds in bark. To limit being incessantly munched by herbivores and damaged by insects, some plants produce chemical defenses. Some of these defenses are simply metabolic by-products, such as the calcium oxalate crystals that render the bark of some pines unpalatable to browsers. Others, such as various alkaloids, tannins, and cyanogens (which give cherry bark its distinctive bitter almond scent and cough-suppressing properties), require greater metabolic input and their synthesis consumes nutrients, but they provide valuable protection to long-lived plants. It's these same compounds that make the bark of some species medically useful.

Two of the most famous drugs we owe to bark are aspirin and quinine. The Greeks used willow bark extracts as long as 2,400 years ago to relieve pain; similarly, many Native American tribes used willow bark to treat colds, fevers, and headaches. In 1827, a French chemist, Henri Leroux, isolated a compound he called salicin from willow bark; a related compound, salicylic acid, was discovered in 1839. Both compounds, though, cause nausea and gastric pain, and chemists continued searching for an effective pain reliever. Another related compound, acetylsalicylic acid, was discovered in 1853, but it wasn't until 1899 that its pharmaceutical value was recognized and the Bayer Company began marketing it as aspirin.

Like many of the 60 or so species of manzanita (*Arctostaphylos*), this one (species unknown) displays eye-catching bark.

Quinine and other antimalarial alkaloids are derived from the bark of several species of *Cinchona,* native to the Andes and related to coffee. There are conflicting accounts of how *Cinchona* trees reached the Old World. In the nineteenth century, both the English and the Dutch tried to smuggle seeds or seedlings out of South America, where the quinine trade was tightly controlled. Eventually the Dutch established large *Cinchona* plantations on Java, and through breeding and selection increased the bark's alkaloid yield from 7% to 17%. Today other drugs are available, but the microscopic protozoan that causes the disease is becoming resistant to many of them, and millions of people are still affected by malaria annually.

To conclude on a happier note, though, where would we be today without the cork oak, whose thick outer bark is used to make flooring, fishing rod handles, woodwind instrument joints, and wine bottle corks by the billion? People have used cork at least since Roman times: Pliny the Elder, writing in the first century A.D., listed fishing floats, women's winter shoes, and stoppers for wine jars among its uses. It takes a cork oak tree 25 to 40 years to build up a layer of cork thick enough to harvest, but the first harvest consists of hard, crumbly material good only for bulletin boards and insulation. If the cork is removed carefully, a new phellogen develops in the phloem 25 to 35 days later. The tree resumes cork production and can be harvested again 9 or 10 years later. Not until the third harvest, however, is the cork of sufficient quality for wine stoppers. The trees typically live 250 to 350 years, so each tree can be harvested many times. The practice of harvesting bark in cork oak forests actually helps preserve this unique ecosystem from land development so many conservation organizations promote the use of natural cork. And even though oenological research suggests that it doesn't really make much difference whether wine is sealed with natural cork, synthetic stoppers, or screw caps, yanking a plastic stopper out of a bottle just doesn't provide the same sort of tactile pleasure that pulling a real cork does. So pull a real cork, pour a glass, and drink a toast to bark.

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Eva Begley, Ph.D., is a botanist and retired environmental planner who has worked in academia, private industry, and government. She lives in Sacramento, California.

A Dream Come True

Peter Ashton

The possibility of being appointed director of the Arnold Arboretum in 1978 had come as a considerable surprise, but I jumped at it. Ever since my first professional appointment in 1962 as forest botanist in the Sultan of Brunei's government, I had been sending plant specimens to the Arnold as one of the six leading botanical research institutions both within and outside the Far East that specialize in the flora of East Asia, tropical as well as temperate. I respected the Arnold's scientific reputation in large part because of former Arboretum director Elmer Drew Merrill's astonishing achievements on the flora of the Philippines and southern China. Arboretum notables Ernest Wilson and Alfred Rehder were also well known to me and, as a life-long gardener and amateur horticulturist, the Arboretum's unique design by Frederick Law Olmsted intrigued me.

Mary, my wife, and I will never forget our first glimpse of the Arboretum. During my interview, I sensed unhappiness among staff; morale was low. Mary was asked why she would wish to leave Scotland and her sheep; "Why on earth do you wish to come to this place?" quizzed another. Even the housekeeper in the fine old guesthouse at the faculty club, where we were accommodated on the Harvard campus, expressed the same feelings, and the (somewhat mythical) view that the Boston area had a crime level unimaginable in Aberdeen.

When I arrived, curation and the living collections policies bore the mark of the celebrated horticulturist Donald Wyman who had been at the Arboretum from his appointment by tropical systematic botanist and director Elmer Drew Merrill in 1935 until his retirement in 1970. Wyman's interest had been in ornamental horticulture, reflected in his book *Wyman's Gardening Encyclopedia,* still the most comprehensive text specifically designed for American gardeners. The Arboretum then, as now, continued to sustain the keen interest and support of many members of the Garden Club of America and the Federation of Garden Clubs, as well as the ornamental nursery industry. But I was skeptical that Harvard and its upper administration really understood its fundamental scientific importance, nor the importance of its potential role within the university. Indeed, only one director following Charles Sprague Sargent, Karl Sax, had used the living collections in his research.

But research universities focus on endeavors that advance scientific theory. The Arboretum's global herbarium collection, and with it the systematic botanists, had been removed to Harvard campus in Cambridge in the 1950s on the recommendation of a review chaired by Professor Irving H. Bailey. That decision alone led to nearly a decade of litigation between the University and the Association of the Arnold Arboretum, Inc. Harvard's adjacent Bussey Institute for plant research finally closed near that time, its distinguished faculty, scholars and researchers having been relocated to Cambridge two decades earlier in the 1930s. The Arnold Arboretum had become a backwater for the University, indeed "an orphan institution" within the broad missions of the University to educate and discover. Among faculty, Carroll Wood was alone in running a course based on the collections by our time, though Peter Stevens also used them later.

Around the time I assumed my position, the Jamaica Plain-West Roxbury neighborhoods had been experiencing long decline, and this, too, had impacted the Arboretum. Trash collection had become a major activity for grounds staff, kids periodically drove beat-up automobiles off the summit of Peters Hill, while two corpses were discovered in our first year, one head-first down a road drain. So, there was no shortage of challenges, but that gave the job particular interest!

Once I accepted this challenging position, it became my goal to reinvigorate the research functions of the living collections of the Arbo-

Peter Ashton in the greenhouse, 1983.

Given the pristine appearance of the Arboretum today, it's hard to believe that it was once plagued by litterbugs and vandals. The photo above shows a trash-strewn slope in the Conifer Collection in 1973.

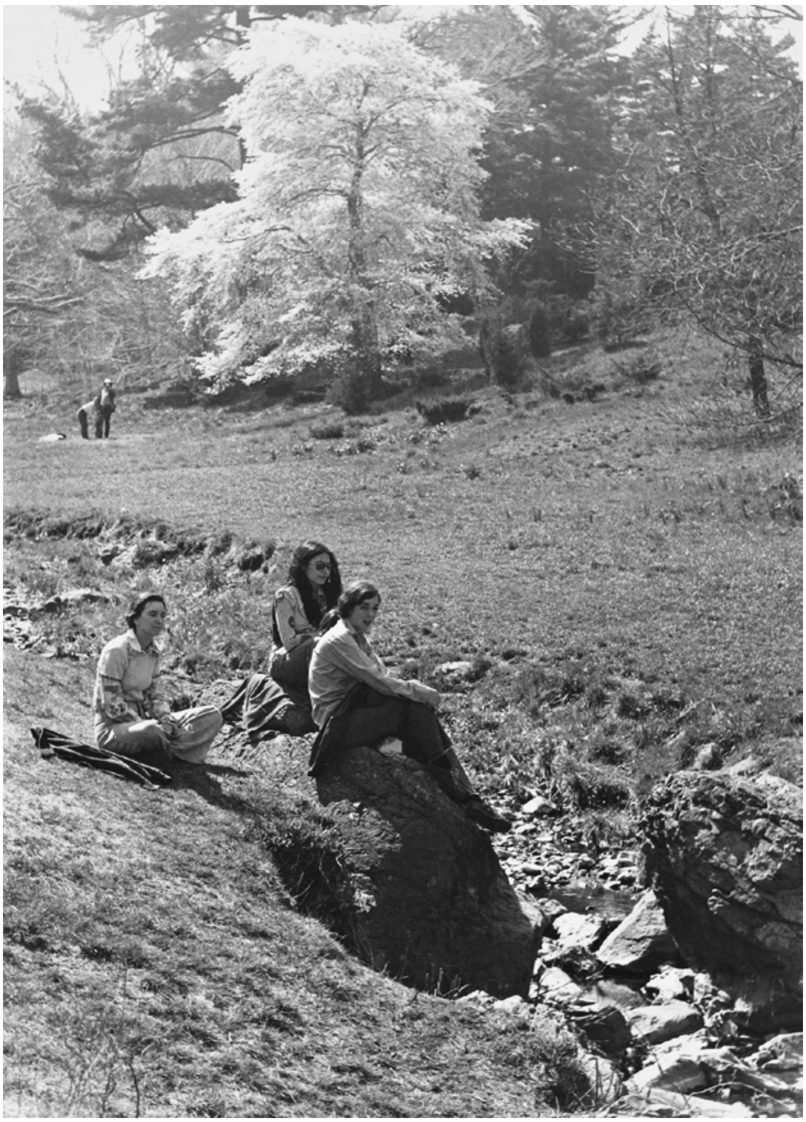
retum. Colleagues in Cambridge had to be convinced that a systematic collection of specimen trees could be a resource for cutting-edge research. But first the living collections themselves had to be reviewed, and a new curatorial policy defined and executed, before a convincing case could be made. Because Sargent, on advice from Asa Gray, one of the world's leading botanists in his time, had established a systematic collection of woody plants, carefully selected and documented, the key was to bring this founding vision back to the fore. As I soon discovered, the Arboretum could then assume a unique role among gardens in Boston that complemented Boston's other two great living botanical and horticultural gardens: Mount Auburn Cemetery, a horticultural landscape focused on trees; and the Garden in the Woods, a native wildflower garden. Together, these three wonderful botanical collections could together offer the public a diversity of plants unequaled anywhere else in the New World, and in very few other places elsewhere. I realized that our collective objective should be to complement, rather than compete.

My first quest, therefore, was to see the original Olmsted road plan and planting scheme. As Sargent had intended, the collections were laid out in such a way that a visitor could observe the families of trees hardy in the climate of Roxbury "without alighting from his carriage." On inquiry, I discovered that the Arboretum library did not have the plans, nor was it clear where they could be found! But the old Olmsted firm buildings and archives still existed at Fairsted in Brookline, thanks to the interest and commitment of the landscape architect Joe Hudack. Arboretum archivist Sheila Connor spent a fortnight searching for the original plans in a garage full of Olmsted's original works; she found them and retrieved them for copying. Only later, Fairsted became a National Historic Site, while the original plans are now in the Library of Congress.

One must recall how revolutionary Olmsted's landscape philosophy was in the late nineteenth century. This was the time when leafy suburbs started to expand on a grand scale, when a new industrial urban rich could express their fantasies in ornate gardens. A vast array of plant introductions from other regions of similar climate had become available during the nineteenth century, to decorate garden space and to ornament domestic architecture. John Claudius Loudon, in England, was the leader, adorning colorful but often fussy gardens with masonry in formal classical mode while, by the end of the century William Robinson was promoting mythical bucolic utopia in elaborate pastiches.

But Olmsted returned to those more serene and unified landscapes, when the whiggish English aristocracy of the eighteenth century could afford to create scenes recalling Claude Lorraine's paintings, and of sufficient scale for architecture to be subordinate to nature. Perhaps significantly, these potentates were against the king and often much in sympathy, politically as well as esthetically, with the American project (did you know that Thomas Hollis, whose name is commemorated in the Harvard library system, Hollis House, and the town of Holliston, was a landowner here in Somerset, England, and a major Harvard benefactor who never visited America?). The foremost proponent of their mythical landscapes, Lancelot "Capability" Brown, used mass plantings of native trees to sculpt his spaces with only the occasional exotic as punctuation. Olmsted was in that spirit and I was empathetic, having been at a high school set in one of Brown's creations.

That was the time when Sargent, Gifford Pinchot, and their colleagues were instigating the first systematic survey of the American tree flora, gauging the extent of America's forests and revealing the enormous diversity of native trees and their potential for parks and gardens—in comparison to England's rather paltry thirty-five native tree species. Olmsted, although responsible for the plan of Biltmore and other great American private estates in the Brown tradition, was primar-



Arboretum visitors near Bussey Brook in the early 1970s.

Peter Ashton in his office at the Arboretum, 1983.

ily focused on bringing an appreciation of natural landscapes to the general public in city parks, university campuses, and in his involvement with the growing conservation movement. Harking back to Capability Brown, he exploited the majestic spaces of the new continent including the growing cities, and achieved what was unachievable in crowded Europe. This accomplishment can still be admired and cherished in Boston's Emerald Necklace. Olmsted's Arboretum plans revealed how he seamlessly combined his philosophy of landscape design with the requirements of a systematic botanical collection. Bearing in mind that trees within genera and even families share much architecture in common, groves of tree families, rather than species, can achieve a similar effect in the landscape. But cultivars selected for outstanding color or shape must be used with utmost discretion.

Thus it became clear that the Olmsted-Sargent design and planting plan not only provided an optimal solution to the design of an arboretum whose purpose was both to provide a representative systematic collection for systematic and comparative research, but it is a historic landscape for designers and planners: a park within which the public can both recreate and learn. I realized that such a project remained unique. The Royal Botanic Gardens, Kew, are a historic landscape, but their land is uncompromisingly flat, denying the curving sweep of Olmsted's contour-hugging roads at the Arnold. Neither did Kew start with a clear accession plan. The aim at the Arnold, to introduce at least three provenances of each taxon, to record location of collection, and to ensure nomenclatural verification with an herbarium voucher, is known to me in only one other great nineteenth century botanical garden, Buitenzorg, which was originally established by the Dutch as an ornamental garden around the palace of their governor-general of the East Indies. Modeled after the king of Prussia's garden Sans Souci ("carefree"), Buitenzorg was set in Bogor, the town that was built as the colonial administrative center on the island of Java. The gardens were reorganized and landscaped under Stamford Raffles, founder of Singapore, who, in his twenties, governed the Dutch East Indies for the British who had expropriated them during the Napoleonic wars. The gardens became a scientific establishment thereafter, while remaining a public park. For me, with a decade in Borneo at the start of my career, the plant explorations of Sargent and Engelmann west of the Mississippi River recalled the great Johannes Teijsmann. Thanks to his intrepid explorations of Borneo and Sumatra in leech-gorged clogs, the Buitenzorg gardens (now the National Botanic Gardens of Indonesia) hold the world's greatest collection of tropical woody plants. From the outset they too had been meticulously documented and curated. And they are beautiful to look at, though nothing compared to the Arboretum! And they have had a research laboratory on their grounds for over a century (though they, too, recently had their herbarium moved to Jakarta by unthinking biological policy-makers).

My prime objective, of returning the Arboretum to the fold of great research institutions within a research university, had therefore to be to review collections policy, and especially to redefine accessions policy. This was admirably accomplished under horticultural taxonomist Stephen Spongberg's leadership. This resurgence also called for enhanced documentation and verification of the living collections. To accomplish this, with National Science Foundation funding, herbarium vouchers were obtained, afresh or for the first time, from all established living collections and sent to taxonomic authorities for verification. That project was led by David Michener, who had little difficulty in attracting a burgeoning team of enthusiastic volunteers. And collections documentation and management was computerized: BG-BASE was introduced by its creator, Kerry Walter, who had come with the fledgling Center for Plant Conservation to whom we had offered the Hunnewell Building attic, at that time unreconstructed. This critical and widely used database system was based on the Arboretum's documentation and workflows, and the Arboretum became the very first user of BG-BASE. Since then, these pioneering efforts in curation and collections management have been enhanced to bear the fruits that represent the Arboretum's current superb program led by Curator of Living Collections Michael Dosmann.

The program of public education, which expanded as membership in the Friends of the Arnold Arboretum had grown, was awarded a major grant to initiate a schools program, including a botany and interpretation program for teachers. In the meantime, we were reaching out to local communities, and to the West Roxbury police who received a Christmas cake from my unstoppable and persuasive Mary. This worked with such effect that officers on horseback soon appeared. And a crash campaign against trash resulted in a dramatic response from the public and less work for grounds staff. Meanwhile the gentrification of Jamaica Plain, Roslindale, and West Roxbury, which was to utterly change community interest in the Arboretum, was starting.

The late 1970s and early 1980s saw an upswing in violence and vandalism in Boston, which led to a subsequent drop-off in visitation to city parks. In response, the Arboretum collaborated with several parks associations and the Boston Parks Department to create the Boston Park Rangers program, with the goal of increasing safety and visitorship. Seen here, mounted Park Rangers interact with Arboretum visitors along Meadow Road in 1983.

Thanks also to Mary's involvement with our volunteers, a support group, the Arboretum Associates, was formed. The group successfully raised funds for a variety of Arboretum projects that had heretofore been on the back burner. The annual plant giveaway and plant sale became a major event thanks to the support gained by the Associates among leading nurseries. For instance, an accompanying auction attracted media attention: Bids came from as far as Paris, and a yellow-flowered *Clivia* went for a princely $2,000!

But returning active fundamental research to the living collections remained an unresolved challenge. Harvard is a "guided democracy." The heart and soul of Harvard is the Faculty of Arts and Sciences (FAS). All academic policy, including

Peter Ashton (center, seated) at a meeting in front of the Hunnewell Building, 1982.

faculty appointments, rests with the faculty themselves. The university's schools have their own faculty and policies. But the allied institutions, such as the Arnold Arboretum, are in a no-man's land in which responsibility for faculty and research appointments has changed from time to time. Those allied institutions that are recognized as essential assets for FAS academic departments were in the best position, for their appointment priorities coincide. But the director of the Arnold Arboretum, clarified by the lawsuit of the fifties, reported directly to the university's president. Derek Bok, president at that time, was

Peter and Mary Ashton in 1988

determined to bring the directors of Harvard's rich panoply of allied institutions, who understandably were perceived as unfettered oligarchs, under appropriate authority within FAS.

This intent was particularly desirable in plant science, which was and still is fragmented under several institutions, each with its own endowment: four herbaria (the Arnold Arboretum, Gray, Ames, and Farlow), the Botanical Museum, Harvard Forest, and the Arnold Arboretum. Only in the case of the Arboretum is there a legal constraint on subsuming the institution within the program of an academic department—and only the Arboretum possessed a sufficient and substantial endowment. President Bok insisted that all research appointments, both curatorial and faculty, receive the support of the faculty of that academic department whose mission was closest to the Arboretum's, in this case, Organismic and Evolutionary Biology (OEB). This at once orphaned the applied research in horticulture and forestry for which the Arboretum had built a distinguished reputation. The Museum of Comparative Zoology (MCZ) had an invaluable research and pedagogic relationship with Harvard's school of applied zoology: the Medical School. But there has been no botanical equivalent at Harvard since the Harvard Forest's program in forestry ceased in 1931. Research appointments at the Arboretum were then exclusively in the field of systematic botany (taxonomy), at that time no longer at the cutting edge of theory as in Sargent's day, although there was about to be a renaissance thanks to advances in molecular genetics. Research was confined to the herbarium, which had been amalgamated with other herbaria in Cambridge.

I saw limitless opportunities for exciting new comparative research that would avail of a systematic collection of living trees, but colleagues in the Arboretum and OEB were unconvinced, skeptical whether candidates of stature could be found. Thanks in large part to the support of Professor Lawrence Bogorad, who chaired the committee of directors of biological institutions at that time, I was able to initiate a search for a junior faculty appointment on the Arboretum staff, in root biology. Bogorad happened to be a distinguished colleague in a different department, Cellular and Developmental Biology. John Einset was appointed, and a modest lab set up for him in the Dana Greenhouses headhouse. His work, on the evolution and systematics of hormonal response to root initiation, was pathbreaking and of both theoretical interest and practical application. Besides, he had the friendly and sympathetic personality that made him a superb instructor and a star among our volunteers and Friends. But Einset did not succeed in gaining tenure, and opinion hardened against my experiment. Most difficult, I was convinced that no research program would flourish at the Arboretum without a good field laboratory, which would allow fresh plant material from the living collections to be brought in at once for study and experiment.

Peter and Mary Ashton at the Arboretum for a reception to honor Peter's receipt of the prestigious Japan Prize in 2007.

Without researchers on the staff who wished to avail of a laboratory, I sought to attract the interest of faculty in the several plant science departments in the universities of the Boston region. Thanks to some beneficent friends of the Arboretum, funds had been promised for construction of a modest lab. But new laboratories are normally approved at Harvard only where there is a potential or existing faculty to attract to them, or where a group of existing faculty campaign for one. Unfortunately, my own research in tropical tree biology could hardly be said to avail of our temperate living collections. Had I depended on the living collections in Jamaica Plain and Roslindale, a case could have been made as a condition of my appointment. Instead, a conclusion was reached at a meeting of the OEB Visiting Committee in 1988 that the Arnold Arboretum should retain a separate existence from the department and therefore FAS, and that no strong case therefore existed for faculty appointments on its staff. Lawrence Bogorad, a past president of the American Association for the Advancement of Science, alone continued to support my viewpoint: It was clearly time for someone more suitably placed to take up the challenge. Eddy Sullivan, educator and at that time vice-mayor in the City of Boston's mayor Kevin White's government, who had become a staunch supporter in my negotiations with the city, quipped, "You don't have to worry, Peter; if it all fails, you can always go home to Ireland"!

Seen in this setting, it was no surprise that my successor as Arboretum director, Bob Cook, was not initially optimistic about the prospects of my case to embed the university's research back into the Arboretum. Bob had come from directing Cornell Plantations, which enjoyed a successful research and pedagogic relationship with academic departments in one of the leading universities in both fundamental and applied agricultural research. In the expected way, he arrived with a new broom. It was not long, though, before he came to realize the importance, even if against all odds, for building a laboratory at the living collections if they were to stand any chance of returning to Harvard's academic fold. Freed of faculty influence as he was by the Arboretum's detachment from FAS, it is to Bob's great credit that with dogged determination he gained the support of the president's representatives in the administration. Those were the times of skyrocketing endowment values, and Bob's ambition came to vastly exceed my wildest dreams. But he—and the endowment—paid a heavy price when the recession of 2008 arrived. But the new laboratory building was nearing completion; it was fortunately too late to go back. Bob Cook should be remembered as the director who successfully brought the Arnold Arboretum back to a position where it could valuably contribute to Harvard's research and pedagogic mission, and in which it could reignite a major program in fundamental tree research—but this is his story to tell. For the first time in almost a century, the magnificent new Weld Hill Research Building might serve as a magnet for a new director, who could be a leader in a field that would avail of both them and what is now again the outstanding research collection of living trees in the temperate world.

And so it has befallen! In spite of severe budgetary constraints, current Arboretum director William (Ned) Friedman has brought the new laboratory building to life with graduate students, with new faculty and classes availing of the living collections, and is attracting researchers from other institutions. Most importantly, thanks to a new generation of faculty in OEB and changing understanding in the Harvard administration, Friedman has been able to gain the university's support for advancing the Arboretum's scholarly mission in spite of current financial constraints. And in the spirit of the original intent, the public programs have been enriched by enhancing public appreciation of science. Regular research seminars have returned to the Arboretum, while the Director's Lecture Series is introducing increasing audiences to a variety of issues in the social as well as biological sciences. My dream has indeed come true, and with a flourish!

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Lighting the Night: The Use of Pitch Pine and Bayberry in Colonial New England

Sheila Connor

TORCHES OF PINE

In dark, small-windowed Colonial homes, the roaring fireplace brightened the room by day, and it often produced the only light available at night. Had domestic animals been abundant, the typical melted beef-suet or mutton-suet candles that the guildmakers produced in England would have been made. Tallow was scarce, however, and the inventive and resourceful settlers turned to materials ranging from extremely combustible meadow rushes soaked in lard to fish oil burned in shallow, wrought-iron holders, called Betty lamps, to illuminate their homes. These lamps

An illustration of pitch pine (*Pinus rigida*) showing the cones still tightly closed, from *A Description of the Genus Pinus* by Aylmer Bourke Lambert, 1832.

sputtered, smoked, and smelled unpleasant. A new method of lighting discovered by the colonists consisted of burning the resin-rich wood of a conifer that grew on the sandy coastal plains and ridges and in the sand barrens of river valleys. *Pinus rigida* earned the names candlewood and torch pine from the Europeans after they had observed how easily the Indians produced a bright flame by igniting several slivers of wood cut from its "fat" heartwood. The colonists referred to these sputtering torches that dripped pitch as "splint lights."

Whether growing in sterile seaside sands, where they are frequently bathed by salt spray, or rooted on exposed, windswept rocky hill tops, the torch or pitch pine thrives under adverse conditions. Easily blown over when young, a pitch pine eventually develops a root system that is substantial and deep enough to anchor it and to allow the tree to grow on an extremely dry site. Trees not more than four inches in diameter can have roots that penetrate to a depth of more than nine feet. Forest fires in these dry, windy habitats are devastating; however, not only do pitch pines survive, they often come to dominate the landscape after a fire. In New England, only *Pinus rigida* and the rarer *P. banksiana,* the jack pine—a tree of the Boreal Forest—are members of a group of conifers known as fire pines. These trees can withstand fire because they have evolved several specialized characteristics. All fire pines are pioneer trees—trees able to tolerate growing in full sun. Some have a high percentage of cones that remain closed until heat generated by fire melts the resin that glues the tips of their scales together, thereby releasing their seeds. These seeds remain viable inside the cone for many years, and they have the ability to germinate on soil totally lacking a humus component. The term "serotinous," which means late-developing, describes the habit of bearing closed cones that contain viable seeds for many years. Jack pines retain their tightly closed cones for so long that they often become embedded in the wood of the tree's branches and can completely disappear as the branches thicken. Pitch pine's special adaptations include a thick, protective bark, some cones that remain closed, and the ability—unusual among conifers—to sprout from dormant buds on the main stem or at the base of the trunk if the tree is burned or cut.

TIM BOLAND

A mature pitch pine cone that has opened and released its seeds. Cones may persist on the tree for years.

In New England, wherever the soil is exceptionally sandy, it is likely that pitch pines will be found. One of the few trees that can grow at the ocean's edge, flourish in salt marshes, and inhabit slowly moving sand dunes, *Pinus rigida* abounds on Cape Cod. Stunted oaks (black, red, scarlet, and white), along with the smaller post oak (*Quercus stellata*) and the Cape's ubiquitous scrub oak (*Q. ilicifolia*), are the common deciduous trees, but rising slightly above their crowns are the branches of the pitch pine, the true indicator of this sand-plain community. Usually reaching heights of less than fifty feet under the best of growing conditions, at thirty feet these pitch pines overtop the Cape's stunted forest canopy or form pure stands of low pine woods. Whether described as being New England 's most grotesque or most picturesque pine, a stand of *P. rigida* growing on a sandy hillside evokes an image of an untamed landscape. Pitch pines seldom grow straight; they twist this way and that. Their bark is remarkably rough and scaly, its color a very dark reddish gray-brown. Sparse, irregularly spaced limbs droop downward. Many of them are dead and devoid of any foliage, but they are still covered with old, open, weathered gray or blackened cones. The stiff, twisted needles grow at the ends of stout, short twigs. Each fascicle, or bundle, has three of these three- to five-inch-long yellowish-green needles. These dense clusters of needles festoon the live branches and also form tufts of foliage along the trunks. A multitude of cones with sharp, curved spines at the end of the scales also cling closely to the branches. A few of these cones mature, shed their seeds, and then fall off; most, however, remain firmly attached to the branches long after their seeds have been dispersed.

PITCH—THE JUICE OF THE PINE

It was *Pinus rigida*'s imperfection as a source of illumination that proved to be a clue to its most marketable asset—its abundance of pitchy tar. In the scramble to find and develop commodities for trade, the production of naval stores—pitch, tar, rosin, and turpentine—flourished on the sand plains of the New England colonies, the home of *P. rigida.* As early as 1628, residents of Plymouth, Massachusetts, requested that "men skylfull in making of pitch" be sent from England. Boiling pine tar made pitch, but extracting pine tar could be accomplished only by burning trees. To extract tar, a kiln is constructed that is much the same as that of a charcoal burner—that is, a furnace that greatly restricts the amount of air reaching the fire. The process requires that a pile of pitch pine be burned in the kiln as slowly as possible, often for two weeks or more, while an encircling ditch traps the liquid product as it oozes outward. The simple process of "boxing" or "milking" a tree—chopping away a section of the lower trunk, followed by chipping a channel in the bark—produced rosin, another salable commodity. Apparently, this process appealed to almost everyone who possessed a hatchet. Although the life span of trees treated this way was shortened, a farmer could add to his yearly income by "boxing" a stand of pine for several seasons.

As the production and trade of naval stores increased, whole forests of pitch pines vanished from coastal regions and from the outskirts of river valley towns. When rampant cutting of these trees occurred near the ocean, dunes became unstable, and drifting sand threatened harbors, homes, and pathways. Less than thirty years after the founding of Plymouth, rigid restrictions governing the cutting and the use of pitch pine had been established. By 1702, the town fathers forbade the taking of any pine from Plymouth's beaches. A wealth of pines grew on the sandy plains along rivers, and the rivers themselves provided an easy means for transporting forest products. Although families

TIM BOLAND

Northern bayberry fruits are small nutlets with a thick waxy coating.

Northern bayberry (*Morella pensylvanica* [synonym *Myrica pensylvanica*]) is a shrubby plant that usually grows to a height of three to eight feet, but, in some situations, it can become a leggy shrub of fifteen feet or so. A typical plant usually assumes a dense, rounded, somewhat conical shape, but in places where the plants are exposed to constant winds, such as the seashore, they form a matted ground cover about twelve to fifteen inches high. Northern bayberry is a pioneer species that can colonize sandy, sterile dunes, nutrient-poor abandoned fields, and disturbed waste places. It is a perfect plant for use in dune stabilization.

The waxy coating on bayberry fruits is a vegetable tallow made up of stearin, palmitin, myrsitin, and glycerides. While ordinary white candles are sometimes coated with bayberry wax to give the olive green color and scent of bayberry, most of the "bayberry" candles sold today are made of a chemically scented synthetic wax or are made from the wax of one or more shrub species endemic to Central and South America that are somewhat related to the North American bayberries.

NANCY ROSE

Pitch pines growing on Cape Cod.

TIM BOLAND

Northern bayberry has leathery, dark green leaves.

were allowed to continue gathering wood for lighting and fuel, the taking of pitch pine for making tar was prohibited within six miles of the Connecticut River. Massachusetts enacted conservation measures in 1715 to protect both the pine trees and the land. No one, without a license, could "cut, carry off, bark or box any pine tree…." Violation of the law carried a fine of twenty-five shillings for each tree harmed. Caught between the need to generate revenues and the desire to conserve resources, the fledgling government levied excise taxes, established fixed prices, and imposed controls on the quality and the quantity of naval stores. This New England industry flamed as brightly and burned out as quickly as a knot of pitch pine. By the first quarter of the eighteenth century, the pine belt in the Carolinas and Georgia—a region with an abundance of yellow and loblolly pine—would claim the lead in the production of these commodities. Thus, North Carolina came to be known as the Tar Heel State and its citizens as "tarheelers."

Multiple specimens of northern bayberry and pitch pine can be seen in the Arboretum's collections.

BY EARLY CANDLELIGHT

For lighting the home, New England's sandplain flora yielded an even more aromatic and cleaner-burning plant product. Sharing the ability of the pitch pine to grow in pure sand, the northern bayberry (*Morella pensylvanica* [synonym *Myrica pensylvanica*]) was abundantly distributed along the coast when the colonists arrived. The native Americans made medicinal tea from its aromatic leaves and bark and knew how to obtain wax from its "berries," but it was the new settlers who first turned the fatty coating on its berrylike nutlets into candles. Burning with a steady blue flame and emitting a pleasant, delicate odor, bayberry wax was considered by the colonists to be far superior to splint lights, pine knots, Betty lamps, and candles made from animal tallow.

In autumn, after the bayberries had ripened, the thrifty housewife turned pounds and pounds of berries into a few precious, straight, green candles. (Between five thousand and ten thousand berries were needed to make a single two-ounce candle.)

Forming low, dense mounds on seaside dunes, the many-branched, angular plants were easy to find when laden with small berries, whose color is unlike that of any other northern plant. Its hard, nutlike seeds are embedded in a waxy substance speckled with grayish or bluish granules. These fruits, about a quarter of an inch in diameter, are borne by female plants, and they appear in conspicuous clusters on short spikes along the branches and at the base of the twigs of the preceding year's growth.

Most of the species in the bayberry family (Myricaceae) are evergreen. Unlike the evergreen southern species, *Morella cerifera* (synonym *Myrica cerifera*), the northern bayberry is deciduous. A wise woman waited to gather the berries until several light frosts had brought the growing season to an end and the bayberry's green, shiny leaves had fallen. Stripping the berries earlier than September 10th was outlawed in Connecticut beginning in 1724. Berry gatherers apparently ignored this legislation, however; and illegally collected berries before the authorized date.

As they picked, the women and children noticed that their hands grew smooth as they acquired a thin film of wax from the berries. Inventive housewives saved some of the berries that they collected and filled cloth bags with them in order to grease the bottoms of their heavy flatirons.

For candlemaking, the twigs and other debris that came home in the berry pails were removed, and the cleaned berries were placed in large cauldrons, covered with water, and heated and simmered for hours. A greenish, oily liquid floated to the top and solidified as it cooled. Repeated several times, this part of the process included straining the liquid through cloth to remove any impurities. Finally, a clear, solid cake of olive green wax resulted. The blue green water that remained was put to good use: homemakers used it to dye their homespun cloth.

Patience and a steady hand came next. Dipping a wick twenty-five times or more into the remelted wax made a thin, tapered candle. Allowing each layer of wax to harden before the candle was dipped again meant that this process could take at least half an hour. Dipping several wicks at once saved time; only the size of the pot governed the number of candles that could be produced. Revolving candle stands that enabled the woman to dip several wicks at once decreased the time required, and tinsmiths made metal molds into which the heated wax could be poured, which eliminated the laborious dipping process altogether. It is no wonder that these highly prized and brittle candles, the finest light source available, were carefully stored in long, narrow boxes specifically made for holding candles.

Not only were bayberry candles a useful domestic product that was saved for use on special occasions, they also became articles of trade in the colonies, and they were probably the first objects manufactured by women to be exported from New England. The English held these candles in highest regard, and they even tried to grow bayberries themselves. The French also hoped to establish bayberry plantations. However, neither the French nor the English succeeded in bringing *Morella pensylvanica* into cultivation on a large enough scale to support a candlemaking industry.

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Erable de Montpellier, the Montpellier Maple

Katherine Urban-Mead

Last year I declared I could never love any other tree as much as a sugar maple. After accepting a several-month ecology internship in Montpellier, France, I bid a teary adieu to the stunning October foliage around my Hudson Valley home. Then I stepped off the airplane into a new world of dusky gray and gnarled Mediterranean greens. Ancient olive trees stand like statues in the roundabouts; streets are dotted with palms, cypresses, and occasional figs; tightly-pruned planetrees line esplanades and bike paths alike. There is no maple syrup here.

On my first day at work, I climbed a rickety external staircase to the third floor, and with some confusion saw samaras waving from an unfamiliar tree growing alongside the stairs. Paired samaras (one-seeded fruits with papery wings) are characteristic of the maples (*Acer*), a group of plants I had worked with as a horticultural intern at the Arboretum last year. During my internship I had puzzled over hawthorn maple (*A. crataegifolium*) and communed with paperbark maple (*A. griseum*), but had never taken time to get to know the species that I now greeted with great glee. It was not a sugar maple, but instead the aptly-named Montpellier maple, *Acer monspessulanum*.

After my joy at finding a local maple subsided, I had to admit that the Montpellier maple is not a particularly elegant tree. It is sometimes referred to as a shrub (*arbuste* in French), with an average height of only 15 to 25 feet (4.6 to 7.6 meters). Its slow growth and small trunk, frequently branched into several stems, give it a craggy feel characteristic of many Mediterranean region trees. Montpellier maple's leathery three-lobed leaves are rounded and smooth-edged, are borne on long petioles, and are only 1.5 to 2.75 inches (4 to 7 centimeters) wide and 1.25 to 2 inches (3 to 5 centimeters) long. By mid-November the morning chill in Montpellier had become crisper; the endearing leaves of the tree I pass each morning turned first yellow then red. Finally brown, they fell and were scattered through the halls by passing boots.

In the spring, Montpellier maple bears small, bright greenish yellow flowers that open earlier than its leaves, followed by the parallel-winged samaras frequently tinted pink or red and maturing to tan. This drought-tolerant species handles occasional cold and persists in USDA hardiness zones 5 to 9 (average annual minimum temperatures -20 to 30°F [-29 to -1°C]; Montpellier has a Zone 9 climate). Montpellier maple is shade intolerant, so should not be sited near faster growing species. It thrives in alkaline and nutrient poor soils; on a recent hike in the Cévennes I found *A. monspessulanum* growing on limestone bluffs near a holly oak (*Quercus ilex*) and the scrub mountain pine (*Pinus mugo*).

Montpellier maple has a wide native range and corresponding variability in form. Taxonomy resource *The Plant List* reports five accepted subspecies—*cinerascens, ibericum, persicum, turcomanicum,* and *microphyllum*; the latter, found in Turkey, Lebanon, and Syria, has very small leaves, just 1.25 inches (3 centimeters) maximum width. Including all subspecies, *Acer monspessulanum* spreads across southern Europe from Portugal to Romania and across Northern Africa and east to the Hyrcanian forests in Iran and Azerbaijan. Here in southern Europe, *A. monspessulanum* is most often confused with the field or hedge maple, *A. campestre.* The field maple, however, has larger, distinctly five-lobed leaves and milky instead of clear sap.

There are three specimens of Montpellier maple at the Arboretum, so you don't need to fly across the pond to find it. Accession 1491-83-B, located just a short way down Oak Path, was wild-collected in the Lautaret botanical garden near Grenoble, France, and is currently 24 feet (7.3 meters) tall. Two other specimens are nestled in the Maple Collection along Willow Path. One young accession (264-2004-B; just under 10 feet [3 meters] tall) originated from a cultivated plant at the Bordeaux Botanical Garden. The second (12507-A), a mature tree accessioned in 1910, is an astonishing 43 feet (13 meters) tall. Bonsai enthusiasts also appreciate *A. monspessulanum* because its small leaves reduce even further under bonsai culture—perhaps we'll see it one day in the Arboretum's Larz Anderson collection.

Although I'll always love sugar maple, there's something to be said for its sturdy Mediterranean cousin. I think I can make some room in my heart for two very-favorite maples.

Katherine Urban-Mead was a 2014 Isabella Welles Hunnewell Intern at the Arnold Arboretum.