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Front cover: After the flood, October 1996. Photograph by Peter Del Tredici.

Inside front cover: The centerpiece of the Arboretum's new exhibit is a striking 8-by-10-foot scale model of the landscape that replicates more than 4,000 trees in 40-to-1 scale. Photograph by Jim Harrison.


Back cover: The five-millionth specimen of the Harvard University Herbaria. Photograph by David Boufford.
Liquidambar asplenifolium.
Tarrenkrautblättiger Storaxbaum.
Bulldozers and Bacteria: The Ecology of Sweet Fern

Peter Del Tredici

Comptonia peregrina, a common roadside plant in eastern North America, provides a case study both of how nature copes with disturbance to the land and of just how convoluted the study of this process can be.

Sweet fern, Comptonia peregrina, is a shrubby member of the Myricaceae, or bayberry family. Its common name is derived from the pleasing fragrance that its tiny, resin-filled, glandular hairs give off when crushed or rubbed, and from its coarsely lobed, somewhat fern-like leaves. Comptonia, a distinctly unprepossessing plant, has a natural range that covers a large portion of eastern North America. Forming a rough triangle, the eastern flank of this range extends from Prince Edward Island and Nova Scotia south into the mountains of north Georgia; the western edge reaches from the southern Appalachians north through Tennessee and Minnesota all the way to central Manitoba; and the northern edge runs from the Canadian plains through central Ontario and Quebec to the Atlantic (Elias 1971). Sweet fern typically grows to three or four feet in height and, over time, forms extensive colonies—up to twenty feet across—from suckers produced by its roots.

As to habitat, sweet fern shows a strong preference for dry, sandy soils with full exposure to the sun. These sites, which include dry, piney woods, exposed mountain slopes, abandoned pastures, pine barrens, highway bankings, gravel pits, weathered mine tailings, and cut-over forested land, have typically experienced some form of disturbance in either the recent or distant past (Schramm 1966; Schwintzer 1989).

Two attributes equip Comptonia for the pioneering role of a colonizer of disturbed soils. The first is its use of nitrogen gas from the atmosphere to produce nitrates—a feat it accomplishes by forming root nodules in symbiotic association with nitrogen-fixing bacteria. The second is an ability to propagate itself vegetatively by means of long, thick roots that run an inch or so beneath the soil surface. These shallow roots form numerous buds in the fall that grow into shoots the following spring. Under the right conditions, Comptonia behaves as a shrubby groundcover, spreading over large areas by means of these root suckers.

Historical Considerations

Sweet fern’s distinctive form and pungent odor made a strong impression on the early European settlers of North America. Nowhere is this more apparent than in a passage from a book written in 1654 by one Edward Johnson, Wonderworking Providence of Sion’s Saviour in New England. Johnson was presenting a second-hand account of the arduous journey made in 1636 by the first English settlers of Concord, Massachusetts, led by Captain Simon Willard. Starting from Boston, they traveled by boat as far as Watertown and then made their way overland, more or less following the meandering Charles River. Johnson describes (and undoubtedly embellishes) a scene in which the wearied pilgrims confront “a scorching plaine, yet not so plaine, but that the ragged bushes scratch their legs fouly, even to wearing their stockings to

The characteristics that inspired the common name sweet fern—tiny, resin-filled hairs and fern-like leaves—can be seen in this plate from Franz Schmidt’s Osterreichs Allgemeine Baumzucht (Vienna, 1792). The plant we know as Comptonia peregrina is labelled under a hybrid of the two names given it by Carolus Linnaeus in his Species Plantarum. It was Charles L’Heritier who demonstrated that the plant did not belong in either of the genera suggested by Linnaeus.
their bare skin in two or three hours." Those without "bootes or buskings . . . have had the bloud trickle downe at every step." And injury was compounded when "the sun casts such a reflecting heate from the sweet ferne, whose scent is very strong, that some herewith have beene very nere fainting, although very able bodies to undergoe much travel."

John Josselyn's reference to sweet fern in his classic work _New-Englands Rarities Discovered_, written in 1672, is considerably more benign: "Sweet Fern, the Roots run one within another like a Net, being very long and spreading abroad under the upper crust of the Earth, sweet in taste, but withal astringent, much hunted after by our Swine: The Scotch-men that are in New-England have told me that it grows in Scotland." Josselyn was an astute observer, as his description of the spreading roots of the plant clearly indicates. His Scottish informants, however, were dead wrong; sweet fern is native only to eastern North America.

It was Carolus Linnaeus who assigned the first modern scientific name to sweet fern, which he did in _Species Plantarum_, published in 1753. Unfortunately, he confused the situation by accidentally giving the plant two names, _Liquidambar peregrina_ on page 999 and _Myrica asplenifolia_ on page 1024. Subsequent authors were left to choose which name to use. The currently accepted name of sweet fern's genus, _Comptonia_, was established in 1789 by the French botanist Charles L'Heritier, who demonstrated that the plant did not belong in either of the genera suggested by Linnaeus. L'Heritier's name commemorates Henry Compton (1632-1713), Bishop of London, a lover of trees and an early supporter of botanical research and exploration.

Linnaeus' student Peter Kalm, who may well have collected the specimens on which Linnaeus' original description was based, provided a particularly interesting reference to sweet fern in his book, _Travels into North America_, written in 1770. In this work, a report of his travels between 1747 and 1750, Kalm noted the medicinal use of sweet fern by indigenous people: "Among the Iroquois, or Five Nations, on the Mohawk River, I saw a young Indian woman, who by frequent drinking of tea had gotten a violent toothache. To cure it she boiled the Myrica asplenifolia, and tied it, as hot as she could bear it, on the whole cheek. She said that remedy had often cured the toothache before." The medicinal use of sweet fern must have been widespread, given that later authors and travelers make frequent reference to its use not only by various tribes of Native Americans, but also by European settlers (Erichsen-Brown 1979).

William Bartram mentions sweet fern only once in his _Travels_, but more significantly, he offered it for sale in his famous _Catalogue of American Trees, Shrubs, and Herbaceous Plants_, published in 1783 (Fry 1996). In this broadside, Bartram listed sweet fern under a hybrid of the two Linnaean names, _Liquidambar Asplenifolia_, noting that it grew on "Light dry sandy Ridges." Two years later, Humphrey Marshall produced the first detailed description of the sweet fern in his book, _Arbustrum Americanum_, also using Bartram's hybrid name, _Liquidambar asplenifolia_. Marshall's publication, which is considered the first book by an American about American trees and shrubs, brings to a close the early history of _Comptonia_. Later botanical authors continued tinkering with the name, but added little original information to the basic understanding of the plant itself.

**Desperately Seeking Sweet Fern**

My own involvement with sweet fern began in 1971 when I started working for the late Dr. John Torrey at the Harvard Forest in Petersham, Massachusetts, just after he had shifted the focus of his research from root physiology to nitrogen fixation. He selected _Comptonia_ as his experimental subject and hired me to grow it in the laboratory. At that time, the symbiosis of legumes with the nitrogen-fixing _Rhizobium_ bacteria was well understood, but almost nothing was known about nitrogen fixation by the so-called nonlegumes that form a symbiotic association with a totally different type of bacterium in the genus _Frankia_. When Dr. Torrey's project started, no one, despite seventy years of trying, had succeeded in isolating the causative bacterium from a nonleguminous root nodule or in culturing it independent of its host. This
failure was the block that held up progress in researching the subject.

With an overabundance of enthusiasm and a dearth of experience, I was hired to bring sweet fern into the greenhouse—domesticate it, if you will—so that we could study the nitrogen-fixation process in a controlled environment. To cultivate *Comptonia* under laboratory conditions, we couldn’t just dig up plants from the field because the roots were always contaminated with fungi and bacteria other than the one we wanted to study. No, Dr. Torrey insisted, we had to grow the plant from seed in sterile sand. In central Massachusetts, sweet fern’s seeds, technically considered to be fruits, ripen around the fourth of July. They are light brown in color, four-to-five millimeters long, and, as they mature, they become enveloped in a burrlike structure that is covered with long, green bracts. The burrs are soft to the touch and give off a delicious, almost spicy scent when one rubs them between the thumb and the forefinger to extract the seeds.

Once we had managed to collect enough seeds to work with, the next hurdle was to get them to germinate. We tried all the standard techniques for stimulating seed germination in woody plants and all of them failed. Subsequent research with excised embryos grown in a sterile culture demonstrated that the failure resulted from the presence of chemical inhibitors located in the innermost seed coat. These inhibitors are not unique to *Comptonia*. In most temperate plants, however, chilling effectively counteracts the inhibitors—not the case with sweet fern seeds. It was only when Dr. Torrey suggested treating the seeds with gibberellic acid, a naturally occurring plant growth regulator, that we were able to get any of them to sprout. Eventually we learned that soaking scarified seeds in a dilute solution of gibberellic acid for twenty-four hours would produce up to
80 percent germination (Del Tredici and Torrey 1976). While these results were satisfying in that they allowed the research program to move forward, they were also frustrating because we could not relate the gibberellic acid treatment to the way the seeds behaved in nature.

The problem stumped me for some time. In four years of studying Comptonia I had examined thousands of plants all across New England but had never found a wild seedling. Invariably, every small plant I found was attached to a root that emanated from an established plant. For whatever reason, I never found Comptonia seedlings under an existing clump of sweet fern. In frustration, I stopped thinking about the problem of seed germination in nature until one day in the spring of 1976, on a walk in the woods in northwest Connecticut, I came upon a site where hundred-year-old white pines (Pinus strobus) had been clearcut and then bulldozed the autumn before. Among all the weeds and whatnot that were emerging, I was amazed to see seedlings of sweet fern growing, their cotyledons still attached. There were no adult plants to be found, just seedlings. In all, I counted 194 of them in an area of less than an acre (Del Tredici 1977).

According to my reasoning, these seedlings must have arisen either from dormant seeds buried in the soil (the so-called seedbank) or from seeds brought in by some dispersal agent. Given the relatively large size of the sweet fern seed and its lack of any specialized dispersal structures, transport by rain or wind could be ruled out; and its inconspicuous appearance and lack of fleshy coverings make dispersal by animals extremely limited. Indeed, the only animal ever reported to eat the sweet fern seeds is the yellow-shafted flicker (Colaptes auratus), a ground-feeding member of the woodpecker family. One F. E. Beal examined 684 flicker stomachs in 1911 and found an undisclosed number of Comptonia seeds in one of them. However, in order to explain by animal dispersal the 194 seedlings that appeared just one year after clearcutting, one would need to postulate a sizeable flock of flickers roaming the countryside, eating sweet fern and defecating exclusively on this one acre in the woods.

The lack of any obvious dispersal mechanism left buried seeds as the only likely explanation for the seedlings in the Connecticut clearcut. The question was, how did they get there? In nature, most Comptonia seeds come to rest within a half meter of the parent that produced them and are soon buried in the leaf litter that collects beneath the plant. As I see it, deep chemical inhibition prevents germination for several years, by which time the seeds are well covered. The litter contributes to delayed germination either indirectly, by excluding light, or directly, by giving off specific chemicals that suppress germination. In either case, a buried seed will not sprout unless brought to the surface after its own internal dormant state has been neutralized. In the Connecticut woods where I found my sweet fern seedlings, this re- surrection was facilitated, albeit inadvertently, by the state forester who upon completion of the logging operation had the whole area bulldozed to encourage the "natural" regeneration of white pine seedlings.

Clearly bulldozing was just what the sweet fern seeds needed. They had been deposited in the soil before the pines grew up, while the land was in pasture, and then germinated after the logging operation brought them to the surface. On the basis of ring counts of the cut pine trees, I estimated that the canopy of pines had closed about seventy years before I came on the scene, the point when sweet fern would have disappeared from the site because of insufficient sunlight. Seventy years, then, is a minimum estimate of the time the seeds could survive in the soil. I have no idea what the maximum is.

It is clear, however, that soil disturbance is an absolute requirement for the germination of Comptonia seeds. Henry David Thoreau made essentially the same observation in his journal on October 22, 1860: "I notice that the first shrubs and trees to spring up in the sand on railroad cuts in the woods are sweet-fern, birches, willows, and aspens, and pines, white and pitch; but all but the last two chiefly disappear in the thick wood that follows." All of the above species, save Comptonia, have wind-dispersed seeds that exhibit no capacity for long-term survival in the soil. Clearly sweet fern's buried seed
Nitrogen Fixation

Eventually, after seven years of work, Dr. Torrey's research team succeeded in isolating the bacterium that is responsible for nitrogen fixation in Comptonia. Using gibberellic acid to stimulate germination, we were able to produce abundant nodule growth on vigorous seedlings that were grown with their roots dangling in a nutrient mist (aeroponics). This system, unlike water culture (hydroponics), allowed the plant roots to develop the hairs through which the bacteria penetrated the root itself (Zobel et al. 1974). By repeatedly subculturing the nodules from one mist box to the next, we eventually were able to produce "clean" nodules that were relatively free of other microbial contaminants (Callaham and Torrey 1977; Bowes et al. 1977). These nodules were then surface-sterilized, macerated together with special digestive enzymes, and incubated on an elaborately formulated nutrient agar. After three weeks of culture, Dale Callaham, who did the isolation work, observed several small colonies of bacteria with filamentous growth. While the unusual morphology of this organism clearly resembled that of an actinobacterium, it was unlike any that had been previously described. It was not until we had obtained a second generation of functional nodules by re-inoculating fresh Comptonia seedlings with a culture of the isolated bacterium that we knew we had the real thing.

This conclusion was corroborated when we isolated the filamentous bacteria from the second-generation nodules and found them to be identical to those of the first generation. It was only by following this elaborate procedure—referred to as fulfilling Koch's postulates—that we could prove that we had the causative organism in hand. These successful results, published...
in 1978, marked the conclusion of nearly seventy years of frustrated attempts to isolate a *Frankia* bacterium from its host plant.

This breakthrough opened wide the floodgates of research on actinorhizal plants, whose important role in colonizing bare, nutrient-poor ground was just starting to be appreciated. Most of the nitrogen fixed by these plants enters the nutrient cycle slowly through the decomposition of fallen leaves, twigs, branches, and fine roots, but over time the contribution of actinorhizal plants to the total ecosystem nitrogen budget can be substantial. Research on red alder (*Alnus rubra*) in the Pacific Northwest, for example, has shown that pure stands of the tree can add up to 280 pounds of nitrogen per acre per year to the forest (Schwintzer and Tjepkema 1990). It is important to keep in mind, however, that nitrogen-fixing plants can typically hold their own against competition only when soil conditions are poor. On fertile ground they seem to lose some of their competitive advantage to other trees and shrubs. In a very real sense, nitrogen-fixing plants sow the seeds of their own replacement by elevating the nitrogen content of the soil.

**Propagation and Cultivation**

Sweet fern's ability to propagate itself from root suckers is another important component of its colonization strategy. Once the plant gets a foothold in a location to its liking, it comes to dominate the area by sending up numerous root suckers. The ever-observant Henry Thoreau made note of this on March 18, 1860: “The sweet fern grows in large, dense, more or less rounded or oval patches in dry land. You will see three or four such patches in a single old field. It is now quite perfect in my old bean-field.”

William Bartram's 1783 offering of sweet fern notwithstanding, the plant has never made much of an impression in the nursery industry.

There are several reasons for this, not least the plant's reputation for being difficult to propagate. Germination from seed, as shown above, is virtually impossible, and digging the plant up from the wild is seldom successful, given the ropy nature of its root system. It wasn't until the early 1970s that a research team at the University of Massachusetts, Amherst, developed techniques that allowed for the plant's commercial production [Hyde et al. 1972].

The authors of that study were seeking to identify plants that would rapidly cover highway bankings, and sweet fern was one of the plants that interested them. They designed an experiment to determine both the best time of year to take root cuttings as well as their optimal size. Two different-sized cuttings were collected twice a month for a period of one year: three inches long by one-quarter-inch diameter and three inches long by one-eighth-inch diameter. Forty-five days after the cuttings had been stuck in individual pots, they were checked to see whether they had produced leafy shoots.

No significant difference was found in the number of shoots produced by the two different cutting sizes over the course of the year, but the time of cutting was highly influential. At least
80 percent of the root cuttings taken between February 24 and May 1 produced shoots, while those taken between May 15 and August 1 produced few or no shoots. Cuttings taken between August 15 and December 10 produced good-to-poor percentages of shoots, depending on the date the cuttings were made. [No cuttings were taken between December 10 and February 24 because the ground was frozen.] Based on these results, the authors recommended that root cuttings be taken before the parent plant started to leaf out, around May in the Boston area. Root cuttings made after the stock plant’s leaves emerged produced shoots in very low percentages. Their observations clearly suggest the existence of an inhibitory hormone produced by the leaves that suppressed the development of the root buds into shoots.

**Landscape Uses: A Community Approach**

Frank Egler, working with researchers at the Connecticut College Arboretum in New London, was among the first to recognize the potential role that sweet fern, as well as other suckering shrubs, could play in the formation of low-maintenance, naturalistic plantings along highway bankings and power company rights-of-way [Kenfield 1966; Niering and Goodwin 1974]. In the course of their studies of old-field succession in the Northeast, the authors developed techniques—specifically the use of herbicides to selectively kill trees—to “arrest” the successional process at the shrub stage of development. Their goal was to manage existing vegetation to form a distinctively beautiful, low-growing landscape that would not interfere with power lines or highway sightlines. In New England, these low-maintenance associations commonly include, along with sweet fern, the following woody plants: pitch pine (Pinus rigida), red cedar (Juniperus virginiana), gray birch (Betula populifolia), meadowsweet (Spirea sp.), bayberry (Myrica pensylvanica), sumacs (Rhus sp.), low and highbush blueberries (Vaccinium angustifolium and corybosum), and quaking aspen (Populus tremuloides).

The University of Massachusetts group took the Connecticut College concept further by working out specialized techniques for actually planting—as opposed to simply managing—the shrub cover on fresh roadcuts and bankings. The authors found that root pieces of sweet fern could be stuck directly into a bare bank in early spring. According to recommended procedure, root cuttings of Comptonia, which can be anywhere from one-sixteenth to one-quarter of an inch in diameter and four to six inches long, should be planted an inch deep and six inches apart and mulched with two to three inches of wood chips. If this “direct stick” procedure is followed, sweet fern will produce a closed, weed-resistant canopy within three to six years.

**A Pathological Problem**

The final chapter in the Comptonia story pits one plant against another in a battle to the death. It concerns a disease that I became aware of only after publishing an article advocating sweet fern for landscape use. To my surprise, several plant pathologists wrote to chide me for my recommendation. Sweet fern, it turns out, is the alternate host of a fungus, Cronartium comptoniae, that causes sweet fern blister rust on hard pines with needles in bundles of two or three. In the Northeast, jack pine (Pinus banksiana) and pitch pine (P. rigida) can be infected, as well as other introduced hard pines. In the South, shortleaf pine (P. echinata) and loblolly pine (P. taeda) can be seriously infected.

During the course of its life cycle the blister rust has two hosts, the susceptible pine species and either sweet fern or its swamp-dwelling relative, sweet gale (Myrica gale). The fungus lives one stage of its life on the leaves of the sweet fern and the second inside the stem of the pine tree. Although Comptonia is only slightly affected by the fungus, the susceptible pine can be seriously damaged or even killed.

Control of the disease is difficult, given sweet fern’s wide natural range, but the forestry literature makes a few simple recommendations, including taking care not to plant infected pine trees and clearing out sweet fern colonies within a quarter mile of any commercial hard pine plantation. In a report on the susceptibility of loblolly pine to sweet fern blister rust, J. D. Artman and T. N. Reeder [1977] observed that sweet fern “may become a major ground cover when dry sites are intensively prepared for planting.” What the authors mean by intensive
A few last leaves cling to the stems of Comptonia peregrina even through the snows of winter.

site preparation is, of course, bulldozing before planting trees. This observation, buried deep within a technical report, confirmed once again the intimate relationship between Comptonia and catastrophic disturbance.

Conclusion
No discussion of Comptonia would be complete without saying something about its effect on the human senses. As the first settlers of Concord learned all too well, the scent of Comptonia on a warm summer’s day can be overwhelming—a thick, resinous pungency that borders on the unpleasant. More spicy than sweet, the warm scent conjures up the fullness of summer, which no doubt explains why Comptonia foliage is often dried for use in sachets and potpourris. I suspect, too, that the use of Comptonia as tea by Native Americans and Europeans may have had as much to do with its pleasing fragrance as with its supposed medicinal attributes.

A second trait of sweet fern, one that catches the eye rather than the nose, is its tendency to hold onto its leaves late into the growing season. Even in the middle of winter one can find a few leaves clinging to the stems of the plant. Thoreau described this feature in his journal entry for January 14, 1860, along with his response to it: “Those little groves of sweet-fern still thickly leafed, whose tops now rise above the snow, are an interesting warm brown-red now, like the reddest oak leaves. Even this is an agreeable sight to the walker over snowy fields and hillsides. It had a wild and jagged leaf, alternatingly serrated. A warm reddish color revealed by the snow.” And finally, in a passage that moves from mundane detail into emotional description, Thoreau writes of the sweet fern stem, densely covered with fine hairs: “As
nature generally, on the advent of frost, puts on a russet and tawny dress, so is not man clad more in harmony with nature in the fall in a tawny suit or the different hues of Vermont gray? I would fain see him glitter like a sweet-fern twig between me and the sun" (October 16, 1859).

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Peter Del Tredici is Director of Living Collections at the Arnold Arboretum.
With the Adirondacks as a backdrop across Lake Champlain, the W. S. Webbs, with guidance from Frederick Law Olmsted, entirely transformed their property to accord with their own vision. Owing to a continuity of ownership and planning, the landscape of the Webbs has lasted now for over a century.

Anyone who walks through the woods in New England can hardly miss the stone fences. Lichen-covered, often half-buried in pine needles, they thread their way up hill and down, now and then meeting each other at odd sharp angles. These fences are such an obvious sign of a drastically altered land use that you begin to wonder how the land once looked. And then you marvel at the sheer strength and determination of the region's first farmers.

The terrain at Shelburne Farms is different. Here, beside Lake Champlain in northern Vermont, you could walk through a thousand acres of woods and pastureland without encountering even a remnant of the typical old stone fences. The landscape is idyllically pastoral, with Brown Swiss cows browsing in verdant rolling meadows. This bucolic setting, unique now in the rapidly developing periphery of Burlington, Vermont's largest city, has long been an anomaly. The truth is that Shelburne Farms was deliberately made to look different from the surrounding countryside. The boundary walls of the old agricultural order were removed, stone by stone, in the 1880s, and the terrain was reshaped on a new and grand scale.

William Seward Webb (1851–1926) had grown up in New York City, where his father was the "pugnacious" editor of a New York paper. Seward Webb studied medicine in Europe and at Columbia. He practiced for only three or four years before turning to finance on Wall Street, where he established his own brokerage house. Before long he became involved in railroad business with William Henry Vanderbilt, oldest son and chief heir of "Commodore" Cornelius Vanderbilt.2

Dr. Webb travelled to Vermont in 1880 to look at the Rutland railroad with an eye to annexing it to the Vanderbilt empire. Although he did not favor acquisition of the railroad, he liked what he saw of Burlington and the Champlain Valley. He also liked the Vanderbilts. In 1881, Seward Webb married Lila Vanderbilt, the next-youngest of William Henry's eight children. Not long after his marriage, Dr. Webb was named president of the Wagner Palace Car Company, suppliers of sleeping cars to the Vanderbilt-controlled New York Central Railroad.

For a wedding present, Lila's father gave her a house on Fifth Avenue at 54th Street, just a block from his own mansion and those of other family members. Their Fifth Avenue house was to be the Webbs' primary residence for thirty years. As the location for their requisite country house, they promptly settled upon the remote and unattractive part of Vermont that had appealed to Dr. Webb.

On the shores of Lake Champlain at Burlington, the Webbs built a rustic summer cottage called Oakledge.3 This was all very well for a young couple, but the Webbs had something grander in mind. Scouting out the area, Seward Webb decided the most desirable land lay along the lake in Shelburne. The farms there may have been worn out, but the topography and the scenery were special. The shoreline was irregular, with rocky promontories and curving
bays. From any point along that stretch of shore, one had the extraordinary view of the blue Adirondack mountains, rising tier on tier, on the far side of the lake. From Lone Tree Hill in Shelburne, three hundred feet above the water, the view to the west was even more impressive.

Webb began negotiating in 1885 to buy up parcels of land in Shelburne. In December of that year, his father-in-law William Henry Vanderbilt died, having doubled the fortune that his father, Cornelius, had bequeathed to him a mere eight years earlier. Lila’s inheritance was only a small fraction of her father’s $200-million estate, but added to Seward Webb’s own rapidly growing fortune, the couple’s means seemed limitless. The Webbs could have almost anything they wanted. Dr. Webb enlarged the scope of his plans for Shelburne and accelerated the pace of his land purchases. Through an agent, he negotiated with local farmers, many of them impoverished, but not all of whom were pleased to learn that they had granted sales options to the same mysterious buyer. By 1891, Webb had purchased all or portions of twenty-nine farms, covering 2,800 acres. The prices Webb paid varied widely, but the average was less than $150 per acre over a six-year period. Existing farm buildings added little if any value; Webb was interested only in land. Still he continued to buy. Eventually he owned almost 4,000 contiguous acres.

Dr. Webb intended all along to reshape the separate farms he was buying into one great unified whole. His first move was to hire an architect to design a suitable house and major farm buildings. His choice of R. H. Robertson was a happy one for both men. Robertson was known to Webb as a designer of railroad stations and as architect of the Gothic Revival Church of Saint James in Manhattan. He worked for Webb for years. With Webb as his patron, Robertson’s major work was done at Shelburne.

One of Dr. Webb’s first directives to Robertson was to ask Frederick Law Olmsted, then the nation’s preeminent landscape architect, to come as soon as possible to Shelburne to confer in regard to the “landscape department.” In his June 1886 letter to Olmsted conveying Webb’s invitation, Robertson wrote that he had been retained to design “a most important Country house, stock barns—stables etc.” for the 1,700 acres that Webb had by that time purchased along the lake. To make sure that
Preliminary Study for Part of Plan for Laying Out the Shelburne Farms Estate for Dr. W. S. Webb, by F. L. and J. C. Olmsted, 1887. The lake shore is at the lower edge of this plan, the house, shown at the center, with its “home grounds” and “home stables” on top of Lone Tree Hill, was actually built close to the lake, contrary to Olmsted’s advice. The plan indicates Olmsted’s division of the estate into separate areas of farm, park, and forest.

Olmsted realized the significance of the project, Robertson wrote that “if justice is done to the situation and conditions it will without doubt be one of the most important and beautiful country places in America and in view of this fact I hope you can undertake the problem.” Olmsted wrote to Dr. Webb immediately, arranging to make an inspection trip to Shelburne the very next week, adding that his charge for a preliminary visit would be $100 and traveling expenses. Within a month after his first visit, Olmsted had formulated the basis for his proposal, which, as he outlined it to his colleague, Charles Eliot, was to be “a perfectly simple park, or pasture-field, a mile long on the lake, half a mile deep, the house looking down over it.”

Olmsted was at the peak of his career when he agreed to advise Dr. Webb. Ten years earlier, having completed his work on the New York City parks, he had moved his office to Brookline, Massachusetts. Since then, his practice had taken him all over the country. He continued to design public parks for cities, including Boston, Detroit, and Washington, DC. He advised on campus plans, ranging from Groton School to Stanford University. He collaborated with prominent architects such as H. H. Richardson on designs for private estates. At about the same time that he took on Dr. Webb as a client, he was working for other members of the extended Vanderbilt family in Newport, Lenox, and Bar Harbor. Biltmore, by far his largest undertaking for a private client, was still ahead. Olmsted’s connection with the Vanderbilts had even included laying out the grounds for the family mausoleum on Staten Island.

Staten Island, as it happened, had been the site of Olmsted’s first contact with the Vanderbilts. In 1848, aged twenty-six and unsure of his life work, Olmsted had attempted to run a farm bought for him by his father. He lasted only two years on Staten Island but did get to know a neighboring farmer, William Henry Vanderbilt (the father, much later, of Lila Webb). Vanderbilt was exactly the same age as Olmsted. He had been rusticated to farming by his father, Cornelius, who at the time considered him “an improvident dolt.” Dolt or not, Vanderbilt’s farm, unlike Olmsted’s, was quite prosperous.

Throughout his career as a landscape architect, one of Olmsted’s primary goals was to improve the environment of the burgeoning cities where more and more people spent their lives. At the same time, he perceived the importance of planning to preserve wilderness areas and places of particular natural beauty. Olmsted worked to protect Yosemite and Niagara Falls, places he deemed to be national treasures, the birthright of all Americans. His work for rich private clients was just as firmly grounded in his belief in the necessity for conserving natural resources.

Wherever he worked, Olmsted was keenly aware of the character and scenery of the locale.
This, to him, was what the word "landscape" meant. He realized that this concern set him apart from others in his field. Most designers, he observed, were unfortunately attuned only to elements, incidents, and features, rather than the landscape itself. This he held to be the direct result of their training as gardeners. "A training which is innocently assumed to be a training in landscape gardening is a training in fact away from it."13

At a time when there were no academic programs in landscape design and planning, Olmsted's own education had depended on his remarkable powers of observation. Even as a young man, he had been keenly aware of scenery and well able to describe what he saw. In an 1845 letter to his father, he had by chance described the actual setting of what, forty years later, was to become Shelburne Farms. Exploring that part of Vermont on a horse, he had observed the marginal state of the region's agriculture. He rode past burnt stumps, patches of mullein, and so little grass that "I should think the poor sheep would find it hard work enough to live, without troubling themselves with growing wool." South of Burlington, standing probably on Lone Tree Hill, the highest point at Shelburne Farms, Olmsted encountered one of the finest views he had ever seen. He admired Lake Champlain with its bays and islands, but the "chief charm" was the mountain backdrop across the lake.

I never saw mountains rise more beautifully one above another the larger ones seeming to cluster round and protect the smaller, nor did the summer veil of haze ever sit on them more sweetly. Back of all rose some magnificent thunderheads and they rose fast too, compelling me at 5 o'clock to take refuge and toast and eggs in a little road-side inn.14

The setting was certainly no less impressive in 1886, when Olmsted responded to Dr. Webb's summons.

Relations between Webb and Olmsted were unfaillingly polite, but not entirely harmonious. Both were men of strong character, with firmly held convictions. Despite disagreements, however, their respect for each other never wavered. Dr. Webb, the client, always sought and demanded the best of everything. He employed Olmsted because Olmsted was unquestionably the foremost landscape architect in the country. Olmsted, in turn, was impressed by the breadth of Webb's vision, the grand scope of his scheme, and, doubtless, the apparently unlimited extent of Webb's resources for carrying out an idea. When he first embarked on the project for Webb, Olmsted, like Robertson, was convinced that, when completed, the design of Shelburne Farms "would be the most interesting and publicly valuable private work of the time on the American continent."15

One of Olmsted's proposals for Shelburne farms, the one that he most ardently promoted, was that the estate include an arboretum of all the trees and shrubs native to Vermont. The arboretum was to accord with the guidelines established by Harvard professor Charles Sprague Sargent in planning the Arnold Arboretum. To stock this "Arboretum Vermontii," Olmsted urged Webb to take advantage of the distinguished nursery of Pringle and Horsford, located just six miles south of Shelburne.16 After discussing the idea with his superintendent, Arthur Taylor, who would be responsible for planting and care, Webb agreed to proceed with the arboretum.17

As envisioned by Olmsted, the arboretum was to follow the curving roadways he had laid out, being set back from the road on both sides. Such a scheme meant that the arboretum would be an integral and very visible part of Shelburne Farms, which was exactly Olmsted's intent. He placed orders with nurseries all across the country for species that Pringle and Horsford were unable to supply in sufficient quantity. Thousands of trees and shrubs were planted under Taylor's supervision, beginning in 1887. For the sake of economy, a vast number were grown to planting-out size in an extensive nursery established on the Shelburne property.

As was his custom, Olmsted had recommended native and hardy plants, based on his analysis of the site. His plant lists included most of the northeastern native trees: ashes, basswood, birches, elms, hickories, oaks, and willows, as well as the American chestnut and the American elm.18 Balsam fir, hemlock, and various native pines were ordered in quantity.
Olmsted expected Pringle and Horsford to collect many shrub species by the hundred from the wild: alders, swamp azalea, blueberry, buttonbush, elderberry, pussy willows, black and red raspberries, wild roses, viburnums, witch hazel, and others. He also ordered native vines, including bittersweet, clematis, and wild grape. Olmsted asked for wildflowers, such as twinflower (*Linnea borealis*) and trailing arbutus (*Epigaea repens*). The plants ordered for Shelburne Farms were certainly far different from the typical ornamentals with which gardeners and estate managers were decorating most other country places at the time. Olmsted's ultimate aim seemed to be to reproduce the plant diversity that the region might have supported a century or two earlier, before the land was cleared for farming. The only alien plants he ordered were western evergreens from P. Douglass & Sons: Colorado spruce (*Picea pungens*) and Douglas-fir (*Pseudotsuga menziesii*).

Webb's ideas for planting began to diverge from Olmsted's as soon as he fully understood what Olmsted was proposing. Webb wanted to include ornamental varieties; the greenery indigenous to Vermont seemed too stark for the Shelburne Farms he envisioned. He began to request tender and exotic species, such as rhododendrons, weeping willows, tea roses, and gardenias. Olmsted pointed out that these would not survive at Shelburne and would be entirely out of character with the landscape. He refused to involve himself with the growing of tropical flowers under glass, if that were Webb's desire.

A great deal of planting was done according to Olmsted's recommendation, but the Vermont Arboretum was never completed. This may have been Olmsted's greatest frustration at Shelburne. He had believed strongly that Shelburne Farms, although privately owned, would have a public purpose. As he wrote when he submitted his preliminary plan to Webb in July, 1887, I have satisfied myself by personal examination of the feasibility of such an arrangement and that a beautiful, interesting, instructive and publicly important arboretum can be obtained, the present natural woods forming an appropriate and harmonious background for it and adding directly to its scientific value.20

Olmsted lost his enthusiasm for Shelburne Farms when he realized that Webb did not share his belief in the educational and scientific importance to the public of the work they might have accomplished there together. After the summer of 1888, Olmsted's sons and associates attended to the work at Shelburne. The senior Olmsted, meanwhile, was becoming deeply involved with an even larger private project, and a much more sympathetic patron. At Biltmore in the North Carolina mountains, George W. Vanderbilt, Lila Webb's brother, granted Olmsted the trust and the latitude that he had not received from the Webbs.

Much of Olmsted's preliminary plan was implemented, as were his carefully articulated principles of design and the separation of conflicting uses. Olmsted divided the property into three areas: "1st Tillage and pasture lands in rotation; 2nd Park or permanent pasture lands; 3rd Forest Arboretum Vermontii."21 He insisted that cattle should be kept from the home grounds, the main roads, and the forest, but without the continual nuisance of gates. To this end, Olmsted proposed the use of sunk fences with retaining walls, like the unobtrusive ha-has of the English landscape school, to confine the livestock. Fences, particularly near the house, were to be as inconspicuous as possible. Even the main entrance gates to the estate could generally be left open, under Olmsted's plan. The existing "straight and graceless" roads were to be changed in course and character to suit the terrain and the lush farmland through which they would run.

The new trees and shrubs were to be set back from the roads, with here and there a grouping brought forward in an apparently random way. "Fine specimen trees of the old spontaneous growth are to be preserved," Olmsted wrote.22 Groups of trees and the undergrowth were to look as natural as possible.

Olmsted emphasized to Webb the importance of having a definite plan before proceeding. Ongoing land purchases made this difficult, if not impossible. In 1889 after purchasing five pasture farms to the south of his original tract, Webb finally agreed to plant the hilly northern part of the estate in trees, as Olmsted had recommended all along.23
A stretch of one of the new roads, here passing between old-growth forest trees interspersed with recent planting. Photo by T. E. Marr, ca. 1900.
The English parks that Olmsted had so admired on his first trip abroad as a young man in 1850 were the chief source of his inspiration throughout his long career. The design principles on which he based his public and private work came from his interpretation of English landscape styles. The idyllic pastoral landscape of Shelburne Farms is typically Olmstedian. The main road rolls through broad meadowland, then up a gentle rise into a stretch of deep woods. Upon emerging again into the open, one glimpses at a distance the lake, or, at another point, the great house. Then the road bends away, and the distant vision is hidden once again. The views that seem so accidental were arranged with care. Transitions from forest to pasture to lawn and flower garden are smooth and gradual. There is a sense of fitness and inevitability about this landscape.

Webb devoted much attention to agriculture at Shelburne Farms, using the latest scientific techniques, which he hoped would set an example for Vermont farmers. Close to the manor house, the Webbs had an ornamental flower garden. There is no indication that the Olmsted office was involved in its design. The earliest garden was laid out in geometrically patterned beds, reportedly modelled after the garden at Hampton Court. The beds were planted each year with massed annuals that had been raised in the estate’s greenhouses. By 1911, Lila Webb was taking more interest in the garden. She was dissatisfied with what she had. Apparently, she herself planned the Italianate garden on which work began in 1912. The new garden ran the entire length of the house, between it and the lake. Long, low brick walls divided the gentle declivity into shallow terraces. At one end of the upper level, a pergola curved around an oval basin. On the lowest terrace, between the arms of a balustraded double stairway, was a lily pool. The garden ended at a parapet, bowed out above the cliff at the lake’s edge. Each season, tubbed bay trees were put out along the balustrade. The scene looked for all the world like Isola Bella at Lake Maggiore or like the Italian-inspired garden of 1850 at Bantry House in Ireland that overlooked a bay of the sea, with mountains all around. In northern Vermont such a garden was definitely unusual.

A garden of this style and magnitude was not uncommon, however, on the estates of the rich in pre-World War I America, when formality
was fashionable and European prototypes were valued. The Webbs, on their frequent trips abroad, had statuary and a sundial shipped home. Stanford White allegedly brought them an antique fountain sculpture from Italy. The Webbs had a mason who worked full-time to maintain the walls and stonework while a troop of gardeners managed the flower beds. There were peony beds, a rose garden, and deep perennial borders backed by majestic spires of delphiniums that echoed the shades of blue in the mountains across the lake.

Lila Webb amassed a comprehensive garden library as her interest grew. Her 1847 copy of (Samuel B.) Parsons on the Rose is inscribed “Lila from Seward, 1912.” She had English books, already classics, by John Sedding and Gertrude Jekyll, as well as the recent works of Helena Rutherfurd Ely, Louise Beebe Wilder, and Mrs. Francis King, among others. Her books included at least three on Italian gardens, those by Charles Platt, Edith Wharton, and George S. Elgood. A tiny 1914 diary by Lila Webb reads as if it were intended to be a calendar of practical hints to other gardeners. If she had filled it with authoritative “dos and don’ts” for each month or week of the year, her book could have followed a time-honored tradition: “Plant Sweet Peas as soon as the frost is out of the ground.” Unfortunately, Lila Webb’s literary efforts petered out not long after the frost would have been out of the Shelburne ground that year.

Seward Webb died at Shelburne Farms in 1926. The following year, by act of God or as an indicator of the insidious onset of neglect, all the potted bay trees along the parapet were killed by an early frost. The glory days were over. Shelburne Farms had been built up very quickly. In typically American fashion, it flourished as long as did its creator. Its decline was precipi-
tous—to a point. The survival and rebirth of Shelburne Farms could be a case study in preservation. Dr. Webb's descendants have shown as much determination, and as much devotion to Shelburne Farms, as their progenitor.

Endnotes


5 Sherman, The House at Shelburne Farms, 16.


7 R. H. Robertson to Frederick Law Olmsted, 17 June 1886, Job File 1031, Box B-74, Frederick Law Olmsted Papers, Manuscript Division, Library of Congress.

8 Frederick Law Olmsted to William Seward Webb, 18 June 1886, Olmsted Papers.


14 Ibid., 64–65.

15 Frederick Law Olmsted to William Seward Webb, 11 April 1888, Olmsted Papers.


17 William Seward Webb to Frederick Law Olmsted, 26 March 1887, Olmsted Papers.

18 The Olmsted firm placed orders with Pringle & Horsford and nine other nurseries in the spring of 1887. See Olmsted Papers and “List of Trees and Shrubs Proposed to be ordered for Dr. W. S. Webb,” 22 April 1887, Frederick Law Olmsted National Historic Site, Brookline, MA.


21 Frederick Law Olmsted to William Seward Webb, 12 July 1887, Olmsted Papers.

22 Ibid.


24 Wieck, "Shelburne Farms," 44


27 Sherman, The House at Shelburne Farms, 76.

This article is excerpted from the chapter on Shelburne Farms in Alan Emmet’s So Fine a Prospect. Historic New England Gardens, newly published by the University Press of New England. Her article on the Boott family’s garden in Boston, a subject she returned to in her new book, appeared in Arnoldia 47(4). The author is a consultant in garden history as well as a writer. Her book is reviewed on page 26.
Itea ‘Beppu’: The Return of the Native

Peter M. Mazzeo and Donald H. Voss

A “garden variety” observation suggests a taxonomic puzzle. The authors sort it out.

In a 1980 article in Arnoldia, Arnold Arboretum horticulturist Gary Koller gave a cultivar name—'Beppu'—to a deciduous Itea growing on top of a stone wall below the Dana Greenhouses in dry, acid soil and full sun. Having grown in that location for six years, the Arboretum's three plants were then about 0.7 to 0.9 meters [two-and-a-half to three feet] tall. In addition to their compact habit, Koller noted their vigor, graceful summer flowers, and the wine-red to reddish purple color of their autumn foliage. These features, he thought, added up to an Itea better for gardens in the Northeast than any other then available.

The plants, accessioned as AA 144-74, came to the Arnold Arboretum from the U.S. Department of Agriculture's Regional Plant Introduction Station at Experiment, Georgia, identified as Itea japonica Oliv. and "Kyushu 226131." In 1955 USDA plant explorer John Creech, later director of the National Arboretum, had collected six specimens of a compact form of Itea japonica growing outdoors at Hot Springs Utilization Station, Beppu, Kyushu, Japan. These were subsequently designated as USDA Plant Introduction 226131 and given the notation "dwarf." Eventually they were propagated and distributed to a number of testing locations, including the Arnold Arboretum. Thus, the complete name of the cultivar designated by Koller was I. japonica 'Beppu'.

However, observation of the habit and flowers of two plants of Itea, each nearly 1.8 meters [six feet] tall, growing side by side in a private garden in northern Virginia led us to question the species identification of I. 'Beppu'. One is I. 'Beppu', the other an unnamed selection of I. virginica that was received in a 1980 Arnold Arboretum distribution of plants propagated from a specimen found near Sharpsburg, Georgia. These plants are so similar in foliage, flower, fruit, and autumn color as to support the hypothesis that they are members of the same species, namely the North American I. virginica, not I. japonica.

The generic name, Itea [the Greek word for willow] derives from a resemblance of the leaves of I. virginica to those of willows. A member of the saxifrage family, its common name is sweetspire, or Virginia willow. Itea includes about ten species of evergreen or deciduous shrubs and trees ranging in the wild from the Himalaya through China to Japan, the Philippines, and western Malesia, plus one species in the eastern United States (Mabberley 1989; Ohwi 1965). Valued for their evergreen, holly-like leaves, as well as for long, pendulous flowers in summer, the Chinese I. ilicifolia and I. yunnanensis are cultivated in warm temperate climates. The only deciduous Itea widely cultivated in North America is I. virginica, which includes the cultivars 'Beppu' and 'Henry's Garnet'.

The native ranges of Itea species are warm-temperate to tropical; hence cold-hardiness limits their use as ornamental plants in the

Overleaf: This illustration of Itea virginica from Curtis's Botanical Magazine (50[1823]: t.2409) includes an atypical trilobed leaf and, on opened flowers, the "starry" petal orientation sometimes found in the southern United States. More generally, petal orientation is nearly erect, giving the inflorescences a "bottlebrush" appearance. The branches bearing inflorescences are usually arching, not upright, as depicted in this plate.
northern United States. In the wild, *I. virginica* thrives in moist soils on the coastal plain from southern New Jersey to Florida, along the Gulf Coast to east Texas, and up the Mississippi valley to southern Illinois. The plant will survive in the Boston area but not without winterkill of branches. The native habitats of *I. japonica* reach from the southern part of Japan’s Kinki district (including Mie, Nara, and Wakayama prefectures) on Honshu southwestward to Shikoku and Kyushu (Ohwi 1965). Thomas Everett (1981) comments that *I. japonica* is “probably hardy in sheltered locations in the vicinity of New York City” but that the evergreen *I. ilicifolia* is not hardy north of the Washington, DC, area.

To test our hypothesis regarding the identification of ‘Beppu’, we compared herbarium specimens of it with specimens of *Itea japonica* and *I. virginica* collected in the wild. The typical herbarium specimen consisted of the terminal 20 to 30 centimeters (eight to twelve inches) of a flowering branch. Because leaf size varies greatly on individual plants of *Itea*, we averaged the petiole (leaf stalk) length and the length and width of the lamina (leaf blade) from the four or five largest leaves on each herbarium sheet. Measurements of floral parts were also averaged. The tabulation below summarizes the typical sizes and shapes of the structures measured, the lower and upper ranges of measurements have been placed in parentheses.

<table>
<thead>
<tr>
<th></th>
<th><em>Itea japonica</em></th>
<th><em>Itea virginica</em></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>'Beppu'</td>
<td>Other</td>
</tr>
<tr>
<td><strong>Leaves</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Petiole length</td>
<td>(5–) 7 (–10)mm</td>
<td>3 (–7)mm</td>
</tr>
<tr>
<td>Lamina length</td>
<td>(71–) 83 (–95)mm</td>
<td>(33–) 52 (–65)mm</td>
</tr>
<tr>
<td>Lamina width</td>
<td>(31–) 37 (–50)mm</td>
<td>(13–) 21 (–27)mm</td>
</tr>
<tr>
<td>Lamina shape</td>
<td>broadly lanceolate to elliptic to ovate</td>
<td>elliptic to slightly obovate</td>
</tr>
<tr>
<td>Lamina apex</td>
<td>acuminate to long-acuminate</td>
<td>acute to short-acuminate</td>
</tr>
<tr>
<td>Lamina base</td>
<td>broadly cuneate to rounded</td>
<td>cuneate</td>
</tr>
<tr>
<td><strong>Flowers</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Raceme width</td>
<td>(8–) 10mm</td>
<td>(11–) 14mm</td>
</tr>
<tr>
<td>Calyx length</td>
<td>1.2 – 1.4mm</td>
<td>2.5 – 3.0mm</td>
</tr>
<tr>
<td>Petal length</td>
<td>1.8 – 2.4mm</td>
<td>(3.5–) 4.2 (–4.8)mm</td>
</tr>
</tbody>
</table>

*Note: 25.4 millimeters equals 1 inch.*
When English botanist Daniel Oliver described *Itea japonica* in 1867, he indicated that smaller flower size distinguishes the species *I. japonica*: “The petals, stamens, and styles are much shorter than in *I. virginica*.” German botanist Camillo Schneider later noted that the flowers of *I. japonica* are scarcely half as large as those of *I. virginica*. Also distinguishing the species is the amount of leaf serration: the leaves of *I. japonica* average five to seven per centimeter while those of *I. virginica* average eight to ten near the widest part of the lamina.

Koller especially admired the compactness of ‘Beppu’. The plant’s siting—in dry, acid soil in full sun—may have had something to do with its stature. Moreover, this dryish moisture regime occurs in an area well north of the climatic range native to either *Itea japonica* or *I. virginica*. Dr. Stephen Spongberg, horticultural taxonomist at the Arnold Arboretum, tells us that *I. japonica* ‘Beppu’ “is only marginally hardy here at the Arboretum, and consequently it dies to the ground each winter. However, each growing season our plants put on new growth to about three feet in height, and they have formed a clump about four feet in diameter.”

In contrast, plants of this clone observed growing in the Washington, DC, area approach a height of 1.8 meters, indicating that *Itea* ‘Beppu’ is hardly “dwarf.” Nor do they die back to the ground in winter, and unlike the plant in Jamaica Plain they receive at least some artificial watering. These factors undoubtedly contribute to their greater height.

On the matter of autumn color, we suggest that it undoubtedly develops more reliably in the Boston area than in Washington, DC, where warm weather sometimes results in persistence of green color and leaf retention into early winter. And that leaves us with one last
piece of the puzzle: was *I. virginica* growing in Japan in 1955? Had it been introduced prior to Dr. Creech’s collecting trip? The answer is yes. One of the herbarium specimens we examined was dated 1929, attesting to the presence of *I. virginica* in Japan well before the introduction into the United States of USDA P.I. 226131. Judging by the printed heading (“Flora Japonica”) on the label of yet another herbarium specimen, this one dated 1910, it too was presumably collected in Japan. Indeed, Dr. Yotaro Tsukamoto, Professor Emeritus of Kyoto University, believes that *I. virginica* may have been in Japan as early as 1887.

That said, we feel confident in concluding that USDA Plant Introduction 226131 from Beppu, Japan, is indeed *Itea virginica*, not *I. japonica*, and that the Arnold Arboretum’s ‘Beppu’ is, in truth, a clone of *I. virginica*. But we note that, independent of species association, this returned native remains the same attractive landscape plant with interesting flowers, good foliage, and fall color that caught the attention of both Dr. Creech and Gary Koller.

**References**


Oliver, Daniel 1867. [Protologue for *Itea japonica* Oliv., sp. nov.] *Journal of the Linnean Society* IX: 164.


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Peter Mazzeo is a botanist, now retired from the U S National Arboretum and residing in Winter Haven, Florida. Donald Voss is a horticulturist and a volunteer in the herbarium of the National Arboretum.
Lives of New England Gardens: Book Review

"The Kingdom of England don't afford so Fine a Prospect as I have."
—Thomas Hancock (1702–1764)

Phyllis Andersen


Regionalism, as defined by Marc Treib in a recent Dumbarton Oaks publication, is based on the interaction of geographical, biological, environmental, and cultural factors. Regionalism in Treib's definition is a dynamic entity constantly evolving and modifying garden form. Building a case for regional identity on too sweeping or static a construct can lead to perilous scholarship. Alan Emmet avoids this pitfall in her admirable new book on historic New England gardens by her very careful rendering of the physical character of site and the personal visions of the garden creators. Certainly there are themes in New England gardenmaking: Anglophilic models, the need for a country seat to balance lives based in commerce, the valuing of horticultural pursuits in a region with a rich nursery tradition. In her elegant style Emmet renders the life of over fourteen gardens—some our grand masterworks: Wellesley, the Hunnewell estate; Shelburne Farms, the Webb family country home, Edith Wharton's The Mount. Others, small, eccentric: Potter's Grove in Arlington, Massachusetts; Roseland in Woodstock, Connecticut; Celia Thaxter's garden on Appledore Island. Of the gardens covered, four are lost and recreated through documentation, most are extant and open to the public in some form of preserved condition, still others remain in private use.

Emmet reflects on the definition of “garden” and establishes her own: “The best gardens convey this sense of their own separateness, a feeling of seclusion and sanctuary from the workaday world. . . . their appearance owes as much to what they exclude as to what they contain.” Like Olmsted, Emmet values the garden as prospect as well as refuge, albeit a prospect that is controlled and exclusive. She is precise in her selection criteria: the garden must typify a particular period or exemplify an innovation and must have a sufficient written record. She begins with the gardens of the early republic in Boston and in Portsmouth, New Hampshire, and ends with Eolia, the Harkness estate in Connecticut, completed just before World War I.

One of the most interesting early gardens is that of the Boott family in Boston. In a chapter aptly titled “Radishes and Orchids,” Emmet describes the fascinating and sometimes sad saga of a family of amateur horticulturists with ties to England. The Boott garden was located in Bowdoin Square on the site of what is now the twenty-two story state office building on Cambridge Street in downtown Boston. Kirk Boott, the founding father, marked his success as an importer of English goods with a substantial mansion and attached greenhouse. With an amateur's zeal he grew tender flowers and fruit. His sons added orchids to the family collection. Emmet captures the spirit of horticultural competition that affected the Boott family and that was supported by such role models as Theodore Lyman and his estate, the Vale, in Waltham and Gardiner Greene and his exquisite terrace garden at the foot of Beacon Hill.

Emmet's rendering of the "lost gardens" is poignant because their loss had as much to do with the fickleness of the second generation as it had with failing fortunes and the imposition of the personal income tax. The ghostly garden traces of Vaucluse, the classically inspired landscape built by the Elam family near Newport, Rhode Island, owes much to Rousseau's romantic, melancholy retreat at Ermenonville. Several families were associated with Vaucluse, none
capable of sustaining its beauty. Sadder yet is the story of the spectacular “Bellmont,” the 117-acre Cushing estate garden in Watertown, Massachusetts. Downing described it as a “residence of more note than any other near Boston” on account of its extensive range of glasshouses and the “high culture of the gardens.” The mansion and glasshouses were designed by Asher Benjamin, but the garden was designed for the most part by its owner, John Cushing, whose fortune was made in the opium trade in China. Using a vaguely Reptonian model, Cushing focused on display: fruit trees, rose and flower gardens, fountains. His interest in technical innovation was as strong as his desire for plants of rare and exotic origin. Cushing’s fortune and social and business connections made his garden the setting for extravagant entertainments for prestigious visitors. Four years after Cushing’s death his sons sold the property for $100,000, not because they needed the money but because their interests were elsewhere.
Emmet notes that even today enormous trees loom up in unexpected places in this corner of Watertown, evidence of Cushing's lost garden. In addition to high-style gardens, Emmet includes several that could only be called personal, highly individual to their owners/creators. Roseland, the Gothic Revival cottage and garden of Henry Bowen in Woodstock, Connecticut, is pictured with its resplendent flower parterres that were planted to be at peak bloom when Bowen hosted a Fourth-of-July party of huge proportions. Roseland, now owned by the Society for the Preservation of New England Antiquities, was evidence of personal patriotism and love of small town civic life. Potter's Grove in Arlington, Massachusetts, was a three-acre parcel just off the main street. Joseph Potter, an individual whose career in commerce and politics was as eclectic as his garden tastes, developed this parcel of land as a private indulgence in a personal rendition of the picturesque. The quirky assemblage of viewing tower, classical urns, mini-cascade, and a pair of dozing lions quickly attracted the public's interest. Potter encouraged public visitation, especially photographers; hence Potter's Grove, now long gone, is memorialized through stereopticon views.

Emphatically in this category of personal creation is the garden of Celia Thaxter on Appledore Island in the Isles of Shoals off the coast of Maine. This garden, well known in its day to a coterie of writers and artists who gathered in cultish form around Thaxter, is equally popular today through the reissue of her book, An Island Garden, and its Childe Hassam watercolor illustrations.

Leon Edel, the noted biographer of Henry James, has noted that "no lives are led outside history or society." Emmet has produced a series of garden biographies that are as enlightening in their rendering of ideas about garden design and social history as they are in their revelations about personal character. Garden creation is a messy business. Books are read, friends give advice, travel inspires new ideas, plants die. Emmet has breathed life into archival documentation to produce a work of scholarship that will inform our garden visits as well as broaden our knowledge of this important segment of New England culture.
The Arnold Arboretum

FALL NEWS 1996

New Exhibit Opens: Science in the Pleasure Ground

For 125 years, the Arnold Arboretum, the country’s oldest arboretum, has been a source of enjoyment and education in and beyond its 265 acres in Jamaica Plain. In October, as the first event in a milestone anniversary celebration, the Arboretum unveiled a new, permanent exhibit in the Hunnewell Visitor’s Center. Titled “Science in the Pleasure Ground,” the exhibit looks back at the Arboretum’s history and reflects on the value of its landscape as a resource for exploring both cultural and natural history. It illustrates a range of topics that include the Arboretum’s role in plant conservation, exploration, and research as well as in the evolution of landscapes, both private and public.

An 8-by-16-foot model of the Arboretum takes center stage in the exhibit. In 40-to-1 scale, more than 4,000 miniature trees replicate the living collections. The model also features historical vignettes of various periods, forming a “mosaic of time.” For instance, one vignette portrays the mansion and landscape plantings of the mid-19th-century merchant and gentleman farmer Benjamin Bussey, whose estate later became the Arnold Arboretum. Another vignette depicts the archeological dig that confirmed the existence of prehistoric habitation on the grounds many thousands of years ago. A rail around the perimeter of the model accommodates further

In the Arboretum’s new 8-by-16-foot model, a vignette of the devastation wreaked by the hurricane of 1938 can be seen on the slopes of Hemlock Hill. High winds knocked down 1,500 trees. Across the road is a replica of the sawmill known to have stood on Bussey (then Sawmill) Brook in 1654.
interpretation of the landscape's evolution.

Surrounding the model, five exhibits illustrate other aspects of the Arboretum’s history: the design of the landscape; plant-collecting explorations; forest conservation here and abroad; American horticulture; and the various uses of wood. The exhibit’s combination of historic photographs, plans, and drawings as well as physical artifacts, video clips, and interactive features is designed to appeal to viewers of varying interest levels. In the plant exploration exhibit, visitors can test their knowledge of the origin of trees in the “plant-matching game,” which provides clues about some of America’s most popular plants.

Another exhibit tells the story of the design collaboration between Charles Sprague Sargent, the Arboretum’s first director, and Frederick Law Olmsted, America’s preeminent landscape architect and designer of Boston’s Emerald Necklace park system. Features in this part of the exhibit include a replica of Olmsted’s drafting table, original landscape drawings dating to 1872, and then-and-now photos of the landscape.

Funded by the National Endowment for the Humanities and by private donations, the exhibit grew out of an earlier NEH-funded book trilogy about the Arboretum published between 1991 and 1995: A Reunion of Trees by Stephen A. Spongberg, New England Natives by Sheila Connor, and Science in the Pleasure Ground by Ida Hay. It is from the wealth of information generated by this trilogy that the “Science in the Pleasure Ground” exhibit, in addition to a program of tours, signage, and children’s field study, developed.

The participation of Living Collections staff ensured that all 4,000-plus miniature trees were planted in their proper places on the new model. Just before completion, Stephen Spongberg organized a tree-planting opportunity for all staff members. Seen here from left are Sheila Baskin, Perry Rivera, Stephen Spongberg, Kyle Port, and John Del Rosso.

Surrounding the new model are five exhibits that illustrate the history of the Arboretum in images, artifacts, video clips, and interactive features. Above is Gilbert Stuart’s 1809 likeness of Benjamin Bussey, a Boston businessman who pursued scientific farming and experiments in reforestation at “Woodland Hill,” one of Boston’s grand country estates.

“Bussey’s Woods,” seen at right in an 1892 etching, was a popular destination for Bostonians seeking fresh air and natural scenery. When Bussey died in 1842, he bequeathed his Jamaica Plain farm to Harvard University for purposes of agricultural research.
Above is E. H. Wilson, one of the Arboretum’s most famous plant explorers, seen in 1907 on one of his collecting expeditions to China. On trips to Japan, Korea, and Formosa (Taiwan) as well as China, he collected more than two thousand plants that were new to Western gardens. Above at right is a travel permit issued to Wilson in western China.

Over the years the Arboretum has sponsored many expeditions to Asia and continues to do so. The herbarium specimen at right documents a plant collected in Sarawak, Borneo, by John Burley, Arboretum Research Director, in 1987. National Cancer Institute researchers, in a test designed to identify properties that inhibit the AIDS virus, discovered that under laboratory conditions an extract of the plant, *Calophyllum lanigerum* var. *austrocoriaceum*, “essentially halted HIV-1 replication.”

Friends of the Arboretum explored the new exhibit at an October gathering to celebrate the opening of “Science in the Pleasure Ground.”
Professor Xue Ji-ru Visits Arboretum

Stephen A. Spongberg, Horticultural Taxonomist

On the afternoon of October 11, the staff of the Arnold Arboretum was honored by a visit from Professor Xue Ji-ru from Kunming in Yunnan Province, China. Professor Xue (who has published many botanical studies under the name Hsueh Chi Ju) was the Chinese forester who in 1946 visited the remote hamlet of Modaoqi in Hubei Province and collected the type specimens on which the Chinese botanists H. H. Hu and W. C. Cheng based their 1948 description of *Metasequoia glyptostroboides*. In January of that year E. D. Merrill, then director of the Arnold Arboretum, received the first shipment of *Metasequoia* seeds from China. Merrill was largely responsible for distributing the seeds of this “living fossil,” frequently known as the dawn redwood, to sister institutions and interested individuals around the world.

While Professor Xue has devoted his long and fruitful career to the study of Chinese bamboos, he was particularly interested to examine the many dawn redwoods growing in various locations in the Arboretum. Earlier in the day he visited the Arboretum’s collections in the Harvard University Herbaria in Cambridge where he saw one of the specimens of *Metasequoia* he had collected fifty years earlier. At a small reception held in his honor in the late afternoon, Professor Xue met many Arboretum staff members and reminisced about his plant discoveries in China.

Open House

The highlight of the 1996 Fall Open House was the opening of the new Arboretum exhibit, but the event also featured tours of grounds and greenhouses, a bucket truck and backhoe demonstration, and refreshments. Once again this year, children’s program staff and volunteers guided a maple-tree treasure hunt for families. Despite brisk winds and threatening skies, it was very well attended.
Harvard University Herbaria Incorporate 5,000,000th Specimen

The Harvard University Herbaria celebrated a major milestone in October—the addition of the 5,000,000th specimen to their collections of dried plant and fungal material. The Herbaria—which include those of the Arnold Arboretum, the Gray Herbarium, the Farlow Herbarium, the Botanical Museum, and the New England Botanical Club—now form the eighth largest such plant collection worldwide, with the largest collection of Asian plants in the United States, the second largest orchid collection in the world, and more than 150,000 type specimens. In each of the past five years, the Harvard Herbaria have acquired approximately 20,000 specimens and have sent out an additional 7,500 specimens in exchanges with other herbaria. The Herbaria also make over 300 loans (25,000 to 30,000 specimens) annually to researchers at other institutions throughout the world.

Harvard’s rich and varied botanical collections can be traced back to Asa Gray who, after coming to Harvard in 1842, described and catalogued the wealth of plant samples that were being collected in the American West and in the Old World. Many of these plants were new to science, and Gray’s activities led to the founding of the herbarium that bears his name.

Charles Sprague Sargent, first director of the Arnold Arboretum, was one of several of Gray’s students and associates who also developed separate botanical institutions at Harvard. A systematic collection was founded at the Arboretum soon after its establishment in 1872. This herbarium now contains approximately 1,307,000 specimens; those of cultivated origin are housed in the Hunnewell Building in Jamaica Plain, those of wild-collected origin are in Cambridge. The Arboretum collections are especially strong in material from Indo-Malesia (India to the Philippines and Papuasia), China, and eastern and southeastern Asia in general. The Chinese and Philippine collections are probably as comprehensive as any in the world. The collections are rich in type specimens largely due to the work of staff members such as Richard A. Howard, E. D. Merrill, E. J. Palmer, A. Rehder, C. S. Sargent, and E. H. Wilson. Several special collections reflect the interests of former staff members. Among them are the Susan McKelvey Agave and Yucca spirit collection and the Shaw collection of the genus Pinus. The herbarium of cultivated plants in Jamaica Plain contains approximately 160,000 specimens and, as might be guessed, is especially strong in woody plants cultivated in temperate regions.
Arnold Arboretum Tot Trot

Chris Strand,
Outreach Horticulturist

More than a hundred runners with strollers lined up in front of the Hunnewell Building on Sunday, September 8, for the start of the Tot Trot, a race to benefit the Italian Home for Children and the New England Home for Little Wanderers. When Boston mayor Thomas Menino punched the starter's horn, the runners surged forward like a scene out of *Charrots of Fire* crossed with *Mr. Mom*. Fathers, mothers, and grandparents pushed their tiny passengers over a 3-mile course that wound its way through the Arboretum.

Prizes were awarded for fastest single, double, and triple stroller as well as to runners in different age categories. No one walked away empty-handed: raffle prizes and chrysanthemums were given to those who didn't finish at the top of their class. All were happy to be supporting two worthwhile charities.

The race was organized by Liza Draper with the help of dozens of volunteers. They plus several sponsors, including the City of Boston and the Baby Jogger Company, were responsible for the race's success. More than $3,000 was raised for the two charities for their work with at-risk children.
Field Study Experiences
Tried-and-True Arboretum Visits for Elementary Schoolchildren

Diane Syverson, Manager of School Programs

Describing the Arboretum’s field study program for schoolchildren has never been simple. To call them field trips minimizes the rich contribution these visits can make to a classroom’s science curriculum. Consider, for example, the experience of Ann Glick, a teacher at Dorchester’s Ellis Mendell School. Last year, Ms. Glick brought her fourth- and fifth-graders for three field study experiences, outdoor investigations used in tandem with her classroom science units. In the fall her students concluded several weeks of seed study with the Arboretum’s “Plants in Autumn” program. Back at school, they developed a seed-dispersal classification system using ideas and seeds gathered during the Arboretum visit. Ms. Glick is especially pleased that the field study activities build on the children’s knowledge, validating their opinions and experience.

The program schedule fills early each year, and many teachers return annually. The approximately 3,000 participants are accompanied by more than 300 teachers, teacher aides, and parents. Field study programs are “Plants in Autumn,” “Seeds and Leaves,” “Hemlock Hill,” “Around the World with Trees,” and “Flowers.” New this year are “Native Plants, Native People” and “Landscape Explorers.”

Lauren Mofford, Field Study Coordinator, joined the staff this spring to replace California-bound Annette Huddle. Lauren’s work experience includes both classroom teaching and volunteer coordination. Thus she comes well prepared both to teach elementary school groups and to work with a staff of forty-two volunteers. Lauren holds degrees from Simon’s Rock of Bard College and Lesley College, the latter a B.S. in environmental studies.

New Staff in Living Collections

Kyle Port, a recent graduate in environmental horticulture from Washington State University in Pullman, Washington, joined the staff in July of this year as Curatorial Assistant for Plant Records. He replaces Todd Forrest, who began graduate studies this fall at the Yale University Forestry School.

In his new position, Kyle is responsible for the computerized database, BG-BASE, that records and monitors each accession (and individual plant) throughout its life at the Arboretum. Kyle also assists Susan Kelley with the computerized mapping of the collections and Stephen Spongberg and Peter Del Tredici with the day-to-day curation and development of the collections. He is also expected to play a major role in implementing the Institute of Museum Services grant recently awarded for a yearlong, in-depth survey of the Arboretum’s current holdings of shrubs and woody climbers that will begin in 1997. Kyle was a horticultural intern in grounds maintenance this past summer.
1996 Fall Plant Sale A Great Success
Lisa Hastings, Senior Development Officer

Take one beautiful fall day, add thousands of choice plants, and the result is a festive, busy, and very successful Fall Plant Sale. The line of members waiting to enter the barn wound behind the schoolhouse, up the hill, and through the auction tents; by end of day, not a plant remained.

Over 1,300 plants were given to the 800 members who came to collect their plant dividend(s). They also took the opportunity to purchase Arboretum plants at member discounts. The plant sale preview permitted early entrance to the barn to 150 upper-level members. Overall attendance was up 45% over our rainy day last year and 20% over 1994.

The sale raised $30,000 to benefit the Living Collections at the Arboretum, a 16% increase over last year. A variety of factors account for the increase, not least the return of the silent auction and a larger straight sales area.

Over 100 nurseries, plant organizations, and individuals supported the event with donations of plants.

The Annual Fall Plant Sale remains the Arboretum’s largest member event, and our primary vehicle for providing members with access to unusual plants. Mark your calendar for the 1997 sale scheduled for Sunday, September 21, 1997.

Grow with us …

When you give cash, stock, or other property to a life income plan supporting the Arnold Arboretum, you will:
- receive income for life
- realize an income tax deduction
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- benefit from Harvard’s professional investment management at no cost to you
- invest in the future of the Arboretum

There are several plans in which you can participate. For more information, please contact:

Lisa M. Hastings, Development Officer
Arnold Arboretum
617/524-1718 ext. 145

Anne D. McClintock, Director
or Planned Giving Office, Harvard University
800/446-1277 or 617/495-4647
**PLANTS OF CHINA**

**Ranunculus**

Foolish Noye

Qinghai Province, Xining, ca. 30 km W of the town of Xining along the Xun-Qing River near Xiao-Qing Gong, 22°15'21"N, 98°41'39"E. Elevation 4100-4200 m. Narrow groves through steep, limestone cliffs. In moss, overgrazed terraces beside stream. Growing with Primula rosea, Cardamine narcissiflora, Lamium album and Lonicera tibetica. Tepals bright yellow, tinged reddish abaxially; anthers with conspicuous nectar bladders; plants locally abundant.

D. E. Boufford, M. G. Donoghue, X. F. Lu, B. C. Tan & T. S. Ying 24/598

20 June 1997

HARVARD UNIVERSITY HERBARIUM