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View of Mount Vernon, undated, probably the 1930s.
Charles Sprague Sargent and the Preservation of the Landscape of Mount Vernon or, “If Washington were here himself, he would be on my side”

Phyllis Andersen

The 1999 commemoration of the bicentennial of George Washington’s death presents an excellent occasion to reflect on C. S. Sargent’s strong commitment to preserve the Mount Vernon landscape and, while accepting the inevitability of change, to ensure that Washington’s original intent remained at the core of restoration efforts.

Resolved: That Mr. Sargent be authorized to direct the pruning, thinning and planting of trees so that, as far as possible, Mount Vernon may be restored to the condition in which George Washington planned and kept it. But that no well-shaped beautiful tree or flowering shrub shall be destroyed, except where they are interfering with other growth, which it is more important to retain.

The Mount Vernon Ladies’ Association of the Union, Minutes of the Council, May 1901

In 1901 Charles Sprague Sargent (1841-1927), then director of the Arnold Arboretum, was asked by the Regent of the Mount Vernon Ladies’ Association, Justine Van Rensselaer Townsend, to give expert advice on the trees of Mount Vernon, the home of George Washington. Sargent made a site visit, asked for relevant historical documentation (in this case a copy of the list of plants Washington ordered from John Bartram in 1792), and demanded complete control of the plantings of the estate. Mrs. Townsend demurred. Sargent’s peremptory manner, his evident dismay at the condition of the trees, and his bold recommendations for removals and replacements intimidated the Association. In broadening the scope of the Association’s initial request, then narrowly defined as aiding in the care of a few of Washington’s trees, Sargent had clearly threatened their mission. “There was no allusion to the work of beautifying or adornment of any kind,” wrote Mrs. Townsend of her request to Sargent, “for our love of Mount Vernon and its precious trees forbade us to think of any change in the well known grounds of Washington’s home.” Sargent declined the position. He must have a “free hand” or he would take no part in the work.

The Mount Vernon Ladies’ Association and Professor Sargent reconnected ten years later thanks to a new, more flexible Regent, Harriet Comegys, and to a softening of Sargent’s view. Sargent’s participation in the preservation efforts at Mount Vernon, which continued until his death in 1927, has been virtually unrecognized, both in accounts of his career and in histories of Mount Vernon. Preserved in the archives of the Association is the extensive correspondence between Sargent, Harriet Comegys, and Harrison Dodge, the superintendent of Mount Vernon, from 1885 until his death in 1937; these documents make it clear that Sargent’s work was broad in scope and went well beyond arboricultural recommendations.

The letters, notes, memos, and internal reports trace a struggle to overcome conflicts and develop a process to preserve a site of national significance, a struggle remarkably similar to the one the landscape preservation community is undergoing today as it seeks to
If Washington had lived all this time he would use the ax, but the ladies believe in having two bad trees instead of one good one, and they have permitted a job lot of kings and princes to stick in blood-leaved Japanese maples and purple beech wherever they wanted to... the place needs a comprehensive landscape plan and the ax.

Letter from Wilhelm Miller, Editorial Department, Country Life in America, to Charles Sprague Sargent, 28 May 1912

The Mount Vernon Ladies' Association of the Union was formed in 1853 to preserve and restore the Virginia home of the nation's first president. Its membership was composed of one woman from each state. The group began by raising funds to purchase Mount Vernon from Washington's heirs. Regarded by many as the first historic preservation organization in the country, the Association should also be honored for its efforts.

develop consensus on guidelines for preserving historic landscape properties. Defining historical appropriateness, balancing the protection of original features against the accommodation of the public, deciding how to replace plants of historic value—all these difficult questions surfaced during Sargent's work at Mount Vernon. While not always resolved, compromise did not come easily to Sargent, the issues were clearly defined by Sargent's straightforward proposals for action. The letters in the Mount Vernon archives reveal by their personal tone the personalities of the participants. Sargent, writing from the Arnold Arboretum or from Holm Lea, his estate in Brookline, Massachusetts, was the irascible consultant, impatient with the pace of the process and the ineptitude of the Mount Vernon work force. Harriet Comegys was patient and thorough, an excellent negotiator in spite of suffering all manner of ailments during her tenure as Regent. And finally there was the sycophantic superintendent Dodge, whose need to please the ladies sometimes got in the way of his work on Sargent's projects.
for its commitment, unusual for the time, to treat the buildings and landscape of Mount Vernon as a single unit; buildings, furniture, garden plants, and agricultural activities were to be equally valued.

Like most preservation groups, the Association was formed around the idea of rescue: the sagging roofs, the lawn waist-high with weeds, the neglected gardens. As if to reassure themselves of the validity of their acquisition, the early histories of the Association and of their ownership of Mount Vernon are filled with the names of the dignitaries that visited—presidents and kings, minor European royalty, religious leaders, heads of exotic nations—and to Sargent’s consternation each was encouraged to plant a tree.

By 1911 the Association had outgrown the high emotion of its save-and-rescue stage and realized that further work would require careful thought and professional expertise. At this point the group had not refined its mission beyond striving not to lose anything already in hand. However, the members were serious, highly organized strategists, remarkably adept at raising funds for special projects, and mutually supportive. Enduring friendships were formed among the members; friendships that, because of geographic distance or age differences, might have never otherwise occurred. Like many early women’s organizations, the Mount Vernon Ladies’ Association adhered to formal rituals and strict protocols that can seem quaintly amusing to us today. But this formal structure may well have developed to deflect any potential criticism that the women of the Association were not capable of handling the serious issues before them as well as protecting them as individual members from intrusive publicity.

You speak about compensation, a retainer, etc. Please dismiss any such subject from your mind. I consider it a great privilege and honor to be allowed to do anything in my power to

restore the grounds of Mount Vernon to the condition in which they were when Washington was alive.

Letter from Charles Sprague Sargent to Harriet Comegys, Regent of the Mount Vernon Ladies’ Association of the Union, 2 October 1914

Charles Sprague Sargent became the first director of the Arnold Arboretum of Harvard University in 1872 and held that position until his death fifty-five years later. His “austere purpose” (to use his daughter’s phrase) was to develop a collection of all the woody plants, both indigenous and exotic, that could be raised in the open air in Jamaica Plain, Massachusetts. The plant collection, begun in the 1870s, was initially gathered from North America and
Europe but by the end of the nineteenth century Sargent's collection policy had expanded to include the entire North Temperate Zone, with emphasis on China and Japan. The metamorphosis of this small scientific station into one of the world's leading study centers for woody plants was due to the expansiveness of Sargent's vision and the single-mindedness with which he pursued it.

Sargent's publications alone would have secured him a significant place in American landscape history. His fourteen-volume *Silva of North America*, published between 1891 and 1902, raised the study of American species to a new level of scholarship. The second edition of his *Manual of the Trees of North America*, published in 1922, was called "an old friend regenerated" and "the only complete guide to our native trees" by Stephen Hamblin, the plant specialist at Harvard's Graduate School of Design, in a review in *Landscape Architecture* magazine. Sargent was also a leader in the effort to establish an American forestry policy. His *Catalog of the Forest Trees of North America* for the Tenth Census in 1884 and the plan he submitted to the New York State legislature for preserving the Adirondack forest placed him in the ranks of John Muir, George Engelmann, and Gifford Pinchot. His association with Frederick Law Olmsted resulted in a major contribution to the design of both the Arnold Arboretum and Boston's Emerald Necklace park system, of which the Arboretum is a part.

In short, by 1911, when the Mount Vernon Ladies' Association of the Union sought advice from him for the second time, Sargent's own reputation, as well as that of the Arnold Arboretum as an institution of international standing, had been secured. His decision to work with the Association was therefore based not on a desire to enhance his own prestige but rather on patriotism and a deep sense of responsibility to a historic site.

Like most groups seeking help with historic preservation, the Association first defined its needs in the narrowest sense: the trees, many planted by George Washington himself, needed professional care. Typical of Sargent, he redefined his role and from the beginning offered advice on the broader requirements for preservation: inventories of both plants and structures, restoration of specific features, vegetation management, and, most importantly, historic research to inform decision-making.

Washington laid out a sweeping lawn, the Bowling Green, edged by serpentine walkways lined with shade trees: Ohio buckeye (*Aesculus glabra*), white ash (*Fraxinus americana*), southern magnolia (*Magnolia grandiflora*), mulberry (*Morus sp.*), poplar (*Populus sp.*). The trees both frame the view of the mansion and provide much-needed shade for the walkways. He planted a wide range of tree species at close

![Harrison Howell Dodge, Superintendent of Mount Vernon from 1885 to 1937.](image)
intervals, with thick underplantings of shrubs. Sargent was sympathetic to this dense planting method, but it did force the Association into some difficult decisions by the beginning of the twentieth century, when many of the trees planted by Washington had reached senescence and extraordinary measures were needed to sustain their lives. Moreover, other trees, planted by subsequent owners, were threatening the health of the original plantings, and volunteer trees had to be identified and removed. All of the now-predictable emotional reverberations attached to tree removal surfaced during Sargent's work with the Association.

Sargent began to visit Mount Vernon at least twice a year, in the fall and the early spring, and a routine soon evolved. Sargent would meet Miss Comegys at Mount Vernon and she, Sargent, and Dodge would walk the grounds and discuss work to be done. Sargent would then go back to Boston and prepare work orders for the season ahead. In the early years he made detailed recommendations both for saving where possible the remaining trees planted by Washington and for removing those that were beyond saving and were beginning to damage other historic plantings. Sargent also used his contacts from the Arnold Arboretum to order a substantial number of plants, primarily for mass plantings: native dogwoods (Cornus florida), yellowwoods (Cladrastis kentukea), and fringetrees (Chionanthus virginicus) were planted to enhance the woodland and park areas. He prepared budget proposals, both long-term and short. He ordered bulbs from Holland and roses from England. He sent plants to Mount Vernon from the Arboretum and from his own garden at Holm Lea. And he offered advice, pithy and to the point: Sargent wrote, when Dodge turned to the U.S.

Samuel Vaughan's 1787 plan of Mount Vernon Washington attested to its accuracy
Department of Agriculture for advice about the boxwoods at Mount Vernon, "I have little confidence in the experts at the Dept. of Agriculture, it is always a good plan to leave well enough alone, especially in the case of old plants and old people."

Sargent was primarily concerned with the woody plants of Mount Vernon and had little interest in the many separate gardens with herbaceous plants. He allowed himself to be drawn into garden projects only with great reluctance. In 1915 he prepared a list of "garden flowers" that would be suitable for Mount Vernon, as Washington’s diaries yielded little information about herbaceous plantings. Sargent’s advice on the suitability of species was based on his knowledge of plant introductions, enhanced by the extensive library he was creating for the Arnold Arboretum.

The ladies of the Association also diverted his attention from the trees in favor of long and difficult searches for exotic plants to fill the greenhouses and conservatory, putting great pressure on him to locate orange and lemon trees as well as oleander, camellias, agaves, and pomegranates. Eventually Sargent refused further detective work, complaining that his pursuit of conservatory plants detracted from his real goal—saving the specimen trees and woodlands, the features at the heart of Washington’s vision for the property.

You certainly would not hang a modern chromo on the walls of Washington’s room because some important person gave it to you, and there doesn’t seem to be much difference between a chromo on the walls and a purple modern tree in the garden . . . No one more than I do wants to preserve the grounds as Washington left them . . .

Letter from Charles Sprague Sargent to Mrs. John Carter Brown, Vice-Regent from Rhode Island, The Mount Vernon Ladies’ Association of the Union, 5 June 1912

In embracing the stewardship of the Mount Vernon landscape, the members of the Mount Vernon Ladies’ Association came to feel that it was their personal garden to add to, embellish, "improve." This misplaced sense of proprietorship is not unusual: indeed, the tendency to "appropriate" historic landscapes is a frequent source of conflict between preservation professionals and committed amateurs. Initially, Sargent, with a certain amount of politeness and reserve, tried to make the Association understand the inappropriateness of some of their embellishments. In 1915 he reacted to the proposal for adding a new cutting garden some distance from the house by writing, "All these detached spots of cultivation more or less remote from the center increase work and are apt to be overlooked and neglected." Later, somewhat less patiently, he characterized as an eyesore the "new" greenhouse that had replaced the original destroyed in a fire, and suggested that using it to grow flowers for sale to the public was somewhat lacking in dignity.

The demand from the public for continual floriferousness (appropriate or not) is a problem at historic sites, and Mount Vernon was no exception. Roses were a continuing subject of debate throughout the sixteen years of correspondence; Association members and others put pressure on Dodge and his garden staff to plant them. Sargent warned that few roses were available during Washington’s lifetime and those that were did not bloom more than once a season. He recommended the York and Lancaster roses and warned against ‘Harrson’s Yellow’, which was not available during Washington’s time. In 1917 Sargent wrote that he had just discovered a rose brought to this country from England by Abigail Adams and still growing in the garden of the Adams House in Quincy, Massachusetts. He noted that he would have a few plants propagated from that shrub for Mount Vernon since its age would have made it appropriate for Washington’s garden.

Sargent had a special interest in restoring the Old Tomb area, using as his guide the writings of Washington and of visitors to the property during his time. At Harriet Comegys’ suggestion, he located a copy of Nathaniel Parker Willis’ 1840 book, American Scenery, and he used the drawings by W. H. Bartlett to identify the trees existing at that time. He pointed out the unsuitability of the existing sundial and of the post and chains in front of the mansion and helped locate replacements appropriate to Washington’s period. But most of all Sargent
George Washington and the Planting of Mount Vernon

Charles Sargent was committed to preserving the trees of Mount Vernon, especially those lining the walkways of the Bowling Green that had been planted by Washington. He was far less interested in the showy floriferousness of the ornamental gardens and was convinced that Washington was of the same mind. Washington redesigned Mount Vernon after he acquired it from his brother’s family, and that design has been the subject of much research and speculation.

In preparation for the reconfiguration of the property, Washington enhanced his garden library, acquiring a 1728 edition of Batty Langley’s *New Principles of Gardening* with its detailed plans for laying out a bowling green with edges defined by dense tree plantings. Washington planted and replanted the walkways in grove configurations rather than formal allées and underplanted the shade trees with dense “shrubberies” of small ornamental trees and shrubs.

Following are excerpts from letters and diaries of Washington.

19 August 1776. A letter to Lund Washington

Plant trees in the room of all dead ones in proper time this Fall, and as I mean to have groves of Trees at each end of the dwelling House, that at the South end to range in a line from the South East Corner to Colo. Fairfax’s, extending as low as another line from the Stable to the dry Well, and towards the Coach House, . . . Seen from the No. Et. Corner of the other end of the House to range so as to show the Barn, &ca. in the Neck . . . these Trees to be Planted without any order or regularity [but pretty thick, as they can at any time be thin’d] and to consist that at the North end, of locusts altogether, and that at the South, of all the clever kind of Trees (especially flowering ones) that can be got, such as Crab apple, Poplar, Dogwood, Sasafras, Laurel, Willow [especially yellow and Weeping Willow, twigs of which may be got from Philadelphia] and many others which I do not recollect at present; those to be interspersed here and there with ever greens such as Holly, Pine, and Cedar, also Ivy; to these may be added the Wild flowering Shrubs of the larger kind, such as the fringe Trees and several other kinds that might be mentioned.

August 1776. A letter to Lund Washington

I wish that the afore-mentioned shrubs and ornamental and curious trees may be planted at both ends that I may determine hereafter from circumstances and appearances which shall be the grove and which the wilderness. It is easy to extirpate Trees from any spot but time only can bring them to maturity.

23 March 1785

Finding the Trees round the Walks in my wildernesses rather too thin I doubled them by putting [other Pine] trees between each.

Laid off the Walks in my Groves, at each end of the House.

29 March 1785

Transplanted in the groves at the ends of the House the following young trees.
Viz.—9 live oak—11 Yew or Hemlock—10 Aspin—4 Magnolia—2 Elm—2 Papaw—2 Lilacs—3 Finge—1 Swampberry & 1 H .

6 April 1786

Transplanted 46 of the large Magnolio of So. Carolina from the box brought by G. A. Washington last year—viz.—6 at the head of each of the Serpentine Walks next the Circle—26 in the Shrubbery or grove at the South end of the House & 8 in that at the No. end. The ground was so wet, more could not at this time be planted there

Excerpts are from *Keywords in American Landscape Design* by Therese O’Malley, Elizabeth Kryder-Reid, and Anne L. Helmreich, Center for Advanced Study in the Visual Arts/National Gallery of Art, Washington, DC, forthcoming. Sketch is courtesy of Maryland Historical Society and Mac Griswold.
was concerned that the Association's embellishments to both grounds and buildings would unnecessarily exacerbate the problem of long-term maintenance. "The thing to do is to reduce the cost of maintenance by permanent improvement," he wrote to Mrs. John Carter Brown in 1916. To that end he recommended that little-used roads be removed and discouraged unnecessary paths and the proliferation of small outbuildings, each with a limited special use.

That we should have at our command if possible every bit of information obtainable, that could in any way be of use in this important work of today, as well as for the Association's benefit in the future.

The Mount Vernon Ladies' Association of the Union, Minutes of the Council, May 1915

It is ironic that Sargent, the botanist-arborist-dendrologist whose far-ranging fieldwork made him famous as an international leader in forest policy and the preservation of scenery, should also have been the strict disciplinarian who demanded that the work of the Association be based on historical scholarship. At his urging, the Boston Athenaeum prepared a bibliography of books and articles relating to George Washington and Mount Vernon based on their own catalog of Washington literature and the holdings of several other libraries including those of Harvard, the American Antiquarian Society, and the Library of Congress. The bibliography took the form of 5,000 handwritten cards housed in a special wooden case that is now in the Mount Vernon archives. [Like many bibliographic endeavors its usefulness quickly diminished because it was not continually updated.]

Elswyth Thane in her 1967 book, Mount Vernon: the Legacy, states that it was partly Sargent's use of Washington's diaries (the Association had obtained typewritten copies of those in the Library of Congress) that motivated the Mount Vernon Ladies' Association to sponsor the diaries' first publication in 1925, edited by the historian, John C. Fitzpatrick. Sargent's correspondence with the Association confirms his enormous interest in the diaries; he continually mined them for bits of information about both the plantings of Mount Vernon and its architectural features. He corresponded with Max Farrand, the Yale historian (and husband of Sargent's former pupil, landscape architect Beatrix Farrand), about the availability of Washington's writings. He prodded the Association to acquire more original documents pertaining to Mount Vernon and through his own acquaintance with antiquarian book dealers acquired several documents himself, which he donated to the Association. His interest in the
historical documentation of Mount Vernon resulted in a short article for the journal *Rhodora* on André Michaux's 1786 visit to Mount Vernon, which Washington had documented in his diaries.²

"... but no trees planted by man have the human interest of the Mount Vernon trees."

From *The Trees of Mount Vernon* by Charles Sprague Sargent, revised edition, 1926

The reincarnation as souvenirs or talismans of trees that were "witnesses to history" has become a familiar form of "preservation." Seeds of historic trees are distributed to far-flung locations; dead trees reappear as commemorative bookends, paperweights, sculptures. While this practice gives some in the preservation field a sense of unease, it cannot be disputed that the tree as icon engages the public's attention, which can then be redirected to the larger issues of preservation. Although Sargent struggled to maintain a dignified context for his work, he did not dismiss the value of this appeal to public sentiment.

A case in point is the so-called "Washington Elm," which stood on the Cambridge (Massachusetts) Common for centuries and was so named because, as the story goes, George Washington took command of the Continental Army under the tree on July 3, 1775. The tree even bore a plaque to this effect. In October of 1923 the Washington Elm fell (or was accidentally pulled over by a workman trying to remove a dead branch). Given no reason to question the tree's historical association, Sargent secured a cross section of the tree's trunk and sent it to a plant anatomist at Harvard's Bussey Institution who confirmed its age. After complicated negotiations between Sargent and the city of Cambridge, the cross section was then sent to Mount Vernon for display in the kitchen fireplace (a location the Cambridge city fathers thought inappropriate).

Either unknown to Sargent, or perhaps dismissed by him, was detailed research compiled...
by Samuel Batchelder of Cambridge and published in the Cambridge Tribune in 1923. Mr. Batchelder very convincingly debunked the Washington association, stating that if Washington stood under the tree he did so to get out of the rain. Nevertheless, the cross section of the tree remained at Mount Vernon for many years and was reproduced with an almost religious aura in brochures and postcards for the general public.

A less questionable project was Sargent’s effort to restore to Mount Vernon the famous sago palm (*Cycas revoluta*) that Washington acquired from Pratt’s Garden in Philadelphia. Washington grew the palm for many years in a small conservatory. A document in the archives of the Mount Vernon Ladies’ Association states that it was sold after the death in 1802 of his widow, Martha, to a Mr. Peter De Windt of Fishkill-on-Hudson, New York, where it flourished for many years. In 1841 the palm was acquired by Henry Winthrop Sargent for the large conservatory on his Fishkill estate, Wedenethe, which passed in 1882 to his son Winthrop Sargent.

At the request of Charles Sargent, who located the long-lost plant, Winthrop Sargent’s widow donated it to Mount Vernon. The tree was installed in the Palm House at Mount Vernon, but was quickly found to have outgrown the space during its time away. The roof was raised more than once, but after thriving for several years the tree began to fail. Numerous remedies and therapies were tried but the plant died in 1934—after Sargent’s death, mercifully, as he had invested considerable time in prolonging its life. In 1941 a cutting from a still-thriving tree at Tudor Place in Washington, DC—acquired from Pratt’s Garden at the same time as Washington’s—was given to Mount Vernon where it has continued to grow. This is the palm we see there today.

By 1922, Sargent, then 81, was dismayed that work on the grounds of Mount Vernon had not progressed more quickly and complained that decision-making was needlessly slow. In November 1922 he wrote to Harriet Comegys, “It is a great regret that having devoted ten or twelve years of my best thoughts and attention to Mount Vernon I have been unable to secure the confidence of the Council to the extent of letting me carry out my planting plans. Tree removals are needed. I wish the Council had more imagination and more power to look into the future. The thing which I feel sure about in this matter is that if Washington were here himself he would be on my side.”

Sargent made his last visit to Mount Vernon in 1923. In June of 1924 a major storm at Mount Vernon seriously damaged a tulip tree (*Liriodendron tulipifera*), a sugar maple (*Acer saccharum*), and an Ohio buckeye (*Aesculus glabra*), all planted by Washington. Sargent gave Dodge stern advice to use only the best arborist available to repair the damage. He wrote to Harriet Comegys that he might have growing in the Arnold Arboretum nursery some small cuttings from a Mount Vernon buckeye and he would send one of them if it matched the one lost. By that time, however, Sargent’s health...
was frail, and although he still went to his office at the Arboretum everyday, as the year progressed he admitted that he could not make the trip to assess the storm damage. Instead he sent the Arnold Arboretum's young superintendent of grounds, Christian Van der Voet, a horticulturist from Holland who had trained at Kew. Van der Voet made several trips to Mount Vernon in Sargent's stead.

Sargent remained involved through correspondence with the work at Mount Vernon until his death in March of 1927. Harriet Comegys died a few months later. Thus ended a friendship based on mutual respect and commitment to the preservation of the Mount Vernon landscape. The only publication of Sargent's sixteen-year relationship with Mount Vernon was his inventory and condition assessment of the trees of the Bowling Green and around the mansion. The Trees at Mount Vernon was first published in 1917 as part of the annual report of the Mount Vernon Ladies' Association. It was updated and reprinted in 1926 as a separate document and was offered for sale at the Mansion for many years. The report includes an introduction, a description and condition assessment of each tree, a scaled plan with all of the trees located and numbered, and appendices that include a list of the trees planted by Washington that had since disappeared.

Several of Washington's original trees remain at Mount Vernon—a great white ash, a tulip poplar—nurtured by Sargent and subsequent generations of consultants and gardeners. Washington's original trees are surrounded by many replacement plants and by the lush, restored ornamental gardens, a significant concern of the present generation of curators and sponsors. But the original trees reflect Sargent's admonition that "no care should be spared to preserve them, and as they pass away they should be replaced with trees of the same kinds, that Mount Vernon may be kept for all time as near as possible in the same condition in which Washington left it."4

Notes

Unless otherwise indicated, all quotations are from material in the Archives of the Mount Vernon Ladies' Association, Mount Vernon, Virginia.

1 Landscape Architecture, vol. 12 (July 1922), 298–299
4 Mount Vernon Ladies' Association of the Union, Annual Report [Mount Vernon, VA 1917], 46

Acknowledgments

Current landscape preservation practice can be greatly enhanced by understanding the actions, as well as the intentions, of the past. In addition to the landscape itself, archives are a vital source of information about these actions. The author wishes to acknowledge the valuable assistance of Barbara McMillan, Librarian of Mount Vernon, and Sheila Connor, Horticultural Research Archivist of the Arnold Arboretum.

Additional Reading


Phyllis Andersen is director of the Institute for Cultural Landscape Studies of the Arnold Arboretum.
Redwood Burls: Immortality Underground

Peter Del Tredici

The California coast redwood, *Sequoia sempervirens*, is famous for many reasons, not least for being the tallest tree in the world, reaching heights over three hundred feet under optimal growing conditions. Indeed, the tree is so spectacular that it has come to symbolize the grandeur and uniqueness of California itself. Since the earliest days of statehood, the redwood tree has played a major role in the lives of California's citizens. No one has described the importance of that role better than Willis Linn Jepson in his famous *Silva of California*:

The writer of these lines is a Californian. He was rocked by a pioneer mother in a cradle made of Redwood. The house in which he lived was largely made of Redwood. ... He went to school in a Redwood schoolhouse, sat at a desk made of Redwood and wore shoes the leather of which was tanned in Redwood vats. Everywhere he touched Redwood. Boxes, bins, bats, barns, bridges, bungalows were made of Redwood. Posts, porches, piles, pails, pencils, pillars, paving-blocks, pipe lines, sometimes even policemen, were made of Redwood. ...

From the tree's perspective, the love affair with the early Californians was perhaps a bit too intense, leading to the logging of over ninety percent of the tree's original range by the late 1950s. It is only through the efforts of private conservation groups, beginning in the 1920s, later by the State of California, and finally the National Park Service, that any of the original, uncut stands of trees exist today. As spectacular as these old-growth forests are, with their trunks disappearing into the fog that enshrouds the forest much of the year, they do not present a complete picture of the species. For that, one must visit redwood stands that were logged fifty to one hundred and fifty years ago. It is here that one finds the multi-trunked specimens that have sprouted from around the stumps of the original trees. In some redwood forests, the second generation of trunks have also been cut, leading to a third generation of sprout growth. Among conifers, the redwood is unique in its remarkable power of basal regeneration. To my mind it is the redwood's ability to resprout—its great vitality—that makes the tree worthy of admiration and study.

My own interest in the coast redwood goes back to my childhood in Marin County, California, where redwoods grow naturally on the slopes of nearby Mt. Tamalpais. Quite literally, I grew up with the tree in my backyard and spent a week every summer vacationing in their midst, along the banks of the Eel River. Even as a child it was hard not to recognize something special about the redwood tree, something that made it different from other trees. Had you asked me about it then, I'm sure I would have said something about their huge size or about the solemnity I felt in their midst, almost like being in church. Such quasi-religious feelings are expressed by nearly everyone who visits an old-growth redwood forest, but few people think about or are even aware of the tree's extraordinary powers of survival.

Studies of Tree Regeneration

Given my long personal connection with the redwood tree, it's not surprising that I chose to study it later in life. Nor is it surprising that I chose to focus on the tree's ability to resprout following traumatic disturbance. I have been studying the regenerative powers of trees for many years, most notably in *Ginkgo biloba*, and it seemed only natural that I should turn to *Sequoia sempervirens* as a research subject, to see whether the redwood behaves similarly. With generous support from the Highsted Foundation in Redding, Connecticut, I was able to visit the center of the "redwood empire," near Eureka, California, to conduct a week of field
A cross section of a 133-day-old redwood seedling clearly showing the well developed bud clusters in the axils of the cotyledons (indicated by arrows). The stem of the seedling, above the cotyledonary node, is about two centimeters in diameter.

Early Stages of Lignotuber Development

The forestry literature on *Sequoia* is clear about the commercial and ecological importance of the tree's ability to resprout after logging, but very little has been written about the precise origin of these sprouts in young plants. My observations on greenhouse-grown *Sequoia* seedlings indicate that lignotuber formation starts with the precocious development of buds located in the axils of the two cotyledons, just as it does in *Ginkgo* and *Eucalyptus*. Within the first six months of life, these buds proliferated to form distinct clusters that protruded from the...
stem and were clearly visible to the naked eye. In a few cases, one or two of these buds produce tiny leafy shoots within six months.

After a few years of cultivation in the greenhouse, nearly all of the young lignotubers were producing leafy shoots and the swelling of the stem associated with lignotuber formation had spread upward to engulf several nodes above the cotyledons.

With redwood seedlings growing in nature, the process of lignotuber development proceeds more slowly than it does in the greenhouse, mainly because the tiny plants are under severe environmental stress. In the wild, one typically finds redwood seedlings growing in areas that have experienced some form of disturbance, such as flooding or road maintenance, that had disturbed the topsoil, leaving the subsoil exposed. Under field conditions, most redwood seedlings do not form visible bud swellings at the cotyledonary nodes until they are between three and six years old. Interestingly, these tiny lignotubers often produce adventitious roots as well as leafy shoots in response to the partial burial that they experience following the heavy rains and erosion characteristic of the region.

Lignotuber Development in Mature Trees

Lignotubers continue to expand throughout the life of a Sequoia tree, eventually forming massive swellings at or just below ground level, and their outer surface is literally covered with suppressed shoot buds. On undamaged trees, the lignotuber typically gives rise to clusters of small leafy shoots that ring the base of the trunk. On trees that have experienced damage, either from logging or erosion, the lignotuber can produce large secondary trunks that equal or exceed the primary trunk in size. Mature trees that were logged 90 to 100 years ago develop lignotuber sprouts well over a meter in diameter. When such second-generation trees are found growing on a steep slope near a stream or a roadcut, the woody lignotuber is readily recognized as a massive “plate” of downward-growing tissue that follows the contours of the ground and extends up to ten feet from the nearest trunk. On such sites, the lignotuber often develops into a kind of clasping organ that completely envelopes large rocks, further stabilizing the tree. As well as giving rise to new shoots, such exposed lignotubers are also the source of new roots that help to anchor trees to the eroding slopes. Indeed, preliminary observations suggest that all of the roots that support a
second-generation *Sequoia* sprout, regardless of its size, are generated by the lignotuber.

**Induced Lignotubers on Layered Branches**

Only once have I observed "layering" in *Sequoia*. Rudolf Becking, a retired ecologist from Humboldt State University, had taken me to see what he assumed was a group of "seedlings" that had germinated following a particularly severe flood in the 1960s. Closer examination showed that they were not seedlings at all. Rather, they were lateral branches of very weak, spindly saplings that had been bent over by limbs falling from the nearby canopy trees and had taken root and reestablished a vertical orientation. Typically, a single, downward-growing lignotuber had developed along the side of the branch in contact with the soil, although in a few cases several lignotubers had formed along the length of the buried stem. On such layered branches, the original connection to its parent trunk had mostly withered away, leaving only the bowed shape of the stem and the off-center lignotuber as evidence of its origin in a branch.

As is the case with lignotubers derived from the cotyledonary node, those formed by layered branches possess the ability to generate both buds and roots. How long it takes for a branch to develop a lignotuber after it has been pinned to the ground is not known, but it is probably at least a year or two. From the ecological perspective, the layering ability of redwood seedlings appears to give them some flexibility in
A trunk burl purchased in a Eureka, California, gift shop that is producing both roots and shoots after six months in the greenhouse.

A fallen redwood tree resprouting from its basal lignotuber.

responding to environmental conditions by migrating from areas of shade into areas with better light.

**Redwood Burls**

The large lignotuber-like structures that are sold in redwood country gift shops are commonly called burls. They develop not below ground, as true lignotubers do, but on the lower portions of the trunks of old redwood trees in response to injury from fire, wind, or flooding. Typically, trunk burls form above the point of injury to the stem and eventually grow out and down to cover the wound. In some cases, particularly when damage to the tree is extensive, great tongues of tissue project from the trunk—two feet or more—creating bizarre structures that resemble the gargoyles on medieval cathedrals. When these structures come in contact with the ground, they can develop both roots and shoots. Indeed, there has long been a cottage industry in the redwood region based on the harvesting of burls for sale to tourists. When placed in a dish of water with the cut side down, they will produce leafy shoots within a week or two. They can even be induced to produce roots after six months to a year if kept in a warm greenhouse with plenty of light and water. Interestingly, only when the orientation of the burl on the tree is reversed—putting the cut side down—will buds sprout out.

My preliminary observations of wild trees suggest that these burls originate on the trunks of old redwoods as wound-induced callus tissue that incorporates nearby buds into its ever-expanding mass. There appear to be two distinct types of burls on *Sequoia* trunks. The “gargoyle” type, usually located on the lower portions of the trunk, is irregular in shape, grows outward and downward, and is covered with sprouts or buds. The second type occurs higher on the trunk; it is nearly hemispherical in shape, does not grow downward, and produces comparatively few sprouts or buds.

In general, trunk burls can be interpreted as a case of uncontrolled bud and cortex proliferation induced by old age, traumatic injury, or environmental stress. The ecological function
A forest of redwoods in Korbel, California, resprouting from their lignotubers three years after clear-cutting.

A postcard showing what is believed to be the largest Sequoia lignotuber ever reported. It was 41 feet across, weighed approximately 525 tons, and supported at least seven large trunks. The burl was uncovered in 1977 at Big Lagoon near Eureka, California.
of trunk burls is to produce new shoots and adventitious roots on trees that have been partially buried under silt from flooding or that were leaning such that they come in contact with the soil (Stone and Vasey 1968). While trunk burls with basal lignotubers are similar, it is important to keep in mind that the lignotuber formed at the cotyledonary node is under strict genetic control, while burls that develop on the stem are under environmental control. In this regard, *Sequoia* is similar to *Ginkgo biloba*, which also produces lignotubers from the cotyledonary node as well as burls on its trunk and branches (Del Tredici 1992, 1997).

**The Economics of Lignotubers**

Regardless of the age or size of the parent tree, redwood lignotubers can resprout within two to three weeks of logging. While most of these sprouts die before reaching maturity, enough of them survive to regenerate the forest. A study of an old-growth forest that had been clearcut five to ten years earlier showed that the rate of resprouting was greatest in trees that had been between 200 and 400 years of age at the time of cutting and it decreased rapidly thereafter, such that trees more than 1,000 years old resprouted at only 20 to 25 percent of the peak rate (Powers and Wiant 1970). The researchers found that 92 percent of all surviving sprouts grew from the lignotuber, 6 percent from the remains of the trunk, and 2 percent from the cut, horizontal surface of the stump. For trees growing on a slope greater than 20 percent, the sprouts were more numerous on the downhill side of the trunk than on the uphill.

The remarkable ability of redwood trees to resprout from lignotubers, regardless of age, is clearly the basis for the redwood's vitality in the face of massive over-harvesting by the timber industry. Essentially, logging has transformed *Sequoia sempervirens* into a clonal organism that slowly expands its range by lignotuber sprouting. The potential dimensions of the redwood lignotuber were first suggested by W. L. Jepson, who described a clump of 45 large redwoods that formed a third-generation "fairy ring" fifty feet by fifty-six feet across. The photo on page 19 shows a giant lignotuber that has been exposed by erosion near the city of Eureka, California.

**The Ecology of Lignotubers**

The importance of lignotuber sprouting to the forestry industry has been abundantly documented, but very little information is available on its ecological significance in the absence of
Unlike most redwoods that sprout from the basal lignotuber, this unusual specimen has sprouted along the entire length of its prostrate trunk, producing a linear grove of trees.

logging. In a 1987 study of an uncut *Sequoia* forest, J. D. Stuart found that basal sprouting in redwood is closely associated with fire. By correlating fire scars on the primary trunk of the tree with basal sprouts from its lignotuber, the author determined that during the presettlement period (between 1775 and 1875), fires occurred regularly at the site, at an interval of about 25 years. Other studies on the cut stumps of old-growth trees also support the idea that fires were common prior to European settlement and that redwood trees are well adapted to survive them (Fritz 1931, Jacobs et al. 1985, Finney and Martin 1992).

These findings from California redwood forests are consistent with studies in other Mediterranean-type climates, which indicate that lignotuber-producing angiosperms are common in areas where fire or other types of frequently recurring disturbances (for example, grazing) are common (James 1984, Mesleard and Lepart 1989). These studies also suggest that, in the absence of logging, sprouting from the lignotuber probably has much greater ecological significance for seedlings and saplings growing in dense shade or on exposed slopes than it does for mature trees (Canadell and Zedler 1994).

It is also worth noting that the trunk of a redwood tree above the basal lignotuber has the ability to resprout following damage from wind, fire, or flooding. At the turn of the century, when fire was commonplace in the redwood region, there were frequent reports of large trees whose foliage had been entirely burned off vigorously sprouting to form lush “fire columns” (Jepson 1923, Fritz 1931). Similarly, I have seen one wind-felled tree sprout new growth along the entire length of the fallen trunk.

**Rejuvenation**

Both morphologically and physiologically, the lignotuber-generated shoots produced by mature redwoods are considered “juvenile”
relative to the shoots on the rest of the tree. This conclusion is supported by in vitro studies that demonstrated that tissue cultures started with lignotuber shoots from the base of a 90-year-old Sequoia were more vigorous and rooted more readily than those started with shoots from the crown of the same tree (Bon et al. 1994). The researchers also identified numerous membrane-associated proteins that were synthesized in greater abundance in cultures derived from lignotuber shoots than those derived from the upper portions of the tree.

In light of this and other similar studies, it is not surprising that as long ago as 1950 Sequoia should have been the first conifer to be successfully cultured using in vitro techniques, by Ernest Ball, and that these cultures were started from lignotuber sprouts. Quite literally, the Sequoia lignotuber can produce physiologically juvenile shoots continually throughout most of its long life. This ability endows the tree with a kind of ecological immortality—by which I mean that as long as environmental conditions remain constant, the tree can live forever, or at least until it's uprooted.

References


Peter Del Tredici is director of living collections at the Arnold Arboretum. Recent publications include a contribution to The Redwood Forest History, Ecology, and Conservation edited by Reed F. Noss and published by Island Press.
Silver Maple: A Victim of Its Own Adaptability

Harold Koda

Few native American trees have a broader range than Acer saccharinum. The species occurs naturally in New Brunswick in northeastern Canada, west through northern Michigan, Wisconsin, and Minnesota, south on a line from southeastern South Dakota to eastern Oklahoma, east to northern Georgia, and back northeast to Maine and New Brunswick—an area covering a third of the continental United States. It is adaptable over the entire country excepting only the lower, subtropical, portion of Florida. It grows most vigorously on the rich, well-drained alluvial soils found along the rivers of the Midwest. In some of the river valleys and floodplains of northern Missouri, eastern Nebraska, Iowa, southern Wisconsin, and Illinois, it is the dominant canopy species. In New York State it is found near swamps in the company of green ash (Fraxinus pennsylvanica).

The range of environments that Acer saccharinum tolerates gives a clue to its success. It can tolerate longer periods of inundation than most other species; in one instance, mature trees succumbed only after two years of constant inundation. It is usually found in soils with a pH above 4.0 (in cultivation, the recommended range is 4.5 to 7.0), but it tolerates the extreme acidity of muck and peat soils of pH 2.0 to 3.3. This unusual degree of adaptability to different environments—the key to silver maple’s wide distribution—results from its distinctive set of biological attributes.

Biological Attributes

Acer saccharinum is a fast-growing deciduous tree found on wetland sites, especially along riverbanks and lake edges. It generally reaches fifty to seventy feet in height at maturity with a forty- to fifty-foot spread, but under protected conditions it can achieve much greater size. The national champion silver maple, in Michigan, was 125 feet tall, 22.58 in circumference, with a crown spread of 111 feet in 1975. At 120 feet in height, the Arnold Arboretum’s centenarian, planted in 1881 next to the wet meadow not far from the Arborway entrance, also measures at the species’ upper range in height. Its short trunk, which divides into several large branches to form a rounded crown, is typical of open-grown silver maples. If growing space is more constricted, the species develops a long, straight stem with a thin crown. Young stems and branches are smooth, but older branches and trunks develop a darker gray surface, scaly and shaggy, with long, narrow flakes. Its most common name is derived from the silver-colored underside of its leaves; other names are soft, white, and river maple.

Silver maple manifests several morphological adaptations to wetland conditions. In response to inundation, seedlings put out adventitious roots above the soil surface, in some cases after the original root system has been destroyed by prolonged soil saturation. Abnormally large lenticels are also responses to soil saturation; they are thought to increase oxygen uptake. And the tree’s shallow root systems are a mechanism used by several plants to survive the anaerobic condition that occurs underground during periods of saturation.

The species’ reproductive cycle also illustrates adaptations that contribute to its success. As a genus, maples attain reproductive maturity over a range of ages; in this respect, the silver maple falls near the middle of the group, with a minimum seed-bearing age of eleven years. Seasonally, however, it develops earlier than most maples; together with red maple (Acer rubrum) it is the earliest maple to flower and seed, and its seeds germinate immediately in early summer, often sprouting on top of the soil where they fall. Silver maple’s flowers are preceded by thick reddish buds that turn greenish yellow,
At 120 feet in height, the silver maple that grows along Meadow Road is the tallest tree in the Arboretum. Nearly 120 years in age, it has survived the icestorm of 1921, the hurricane of 1938, and the pruning subsequent to those and many other storms.
similar to those of *A. rubrum* but slightly larger. The buds appear before the leaves, in late winter or very early spring, with males and females crowded separately on nearly stalkless clusters. Flowering on each tree is generally completed within a very short period—a day or so—and often the blossoms drop before the leaves fully develop. Therefore, the period of pollen receptivity is typically less than a week.

The ripening period for the winged seeds (technically, *samara*) is likewise very concentrated, with all the seeds being released within less than two weeks. Long-distance dispersal is ensured because the V-shaped samara, attached by a flexible, threadlike stem, can be released from the tree only by a strong wind; after release its mobility is further enhanced by its propeller-like motion. Seeds germinate most successfully when they fall on moist, disturbed soil with leaf litter or other organic matter.

The seedling at first requires full sun to establish itself, followed by partial shade—a pattern well adapted to environments common to silver maple. The tree’s early fruit formation and seed dispersal, together with immediate germination, allow the seedlings to begin growing unhindered by dense canopy and competitive cover; later they take advantage of thickening canopy and groundcover to meet the need for shade. However, while some moisture is essential for germination, seedlings may be stunted if the soil is saturated, in which case a drier soil is needed to allow them to recover. Nature usually fulfills this requirement with the shrinking of streams and rivers in summer and the attendant drying of the banks.

As an abundant producer of early seed crops, silver maple is an important food source for a wide range of birds (grosbeaks, finches, wood ducks, wild turkeys, other game birds) and small mammals (squirrels and chipmunks). Its early buds are also of value to squirrels in late winter when their stored resources are depleted. Even the tree’s bark is used—as food for beavers—and white-tailed deer and rabbits browse its foliage. And because of its propensity to develop trunk cavities, silver maple often shelters breeding birds (woodpeckers, wood ducks, goldeneys, owls) and nesting mammals (raccoons, opossums, squirrels, and bats).

### Silver Maple in Cultivation
The very aspects that make *Acer saccharinum* valuable in the uncultivated environment make it problematic in urban and suburban settings.

C. S. Sargent commented on this *Acer saccharinum* in his *Silva* of North America (1891). “The Silver Maple is a fast-growing tree, even after it has attained a large size. The great tree on the meadows in Northampton, Massachusetts, mentioned by [George Barrell] Emerson [in his *Forest Trees of Massachusetts*, 1859], had a trunk circumference at three and a half feet from the ground of twelve feet six inches in 1837. Fifty-two years later the trunk, which had become hollow and much decayed, measured at the same distance from the ground seventeen feet four inches.” This photo dates from the turn of the twentieth century.
For example, the ease with which cavities form in its soft wood indicates the species’ susceptibility to storm damage, insect predation, and fungal infestation. Its generous scattering of samaras produces uncontrollable litter, and its shallow, hydrophilic root system can wreak havoc with paving and groundcovers, as well as choke sewer lines and water mains.

Michael Dirr’s description of *Acer saccharinum* reflects these problems: “Broken limbs, limited ornamental attributes, and a gross-feeding root system that buckles sidewalks and clogs drains have inhibited its planting. The fastest growing maple species, it is at the same time the most susceptible to breakage in storms.” However, he goes on to conclude that it is “[a] reasonable choice where few other species will grow or where there is need for a truly fast-growing shade tree.”

An assessment by Donald Culross Peattie thirty years earlier, in *A Natural History of Trees of Eastern and Central North America*, differs greatly. Peattie’s description of silver maple verges on the exultant. Unlike Dirr, he sees in it not a battered tree of “limited ornamental attributes,” but one that can make “a railroad station look like a home, and [adds] a century to the appearance of a village street.” For Peattie, *Acer saccharinum* is “a magnificent Maple with short columnar trunk and long branches which, at least in the lower half of the tree, sweep grandly down toward the ground and rise again near the tip in a gesture of airy grace. In the upper tree the branches are apt to be ascending, so that the outline . . . is somewhat pagoda-like.” It is “wraith-like” in winter with a “fine, flaky, gray bark . . . almost silvery”; its fruits in spring are “dragonflies’ wings”; it is in “full beauty” in summer, when “every breath of wind is sure to set the foliage to spinning,” or in storms, when it is “whipped into continuous whitecaps, a threshing and seething and flashing . . . silver.” In the autumn, “it turns . . . a pale clear yellow” while retaining its silver undersurface, so that “the greenback leaf of yesterday becomes a banknote.”

Peattie attributes the supposed flaws of *Acer saccharinum* to overly pragmatic landscape architects who complain of its susceptibility to insect pests, ice and wind damage, and its comparatively short life—complaints to which he responds, “It may be that we should always listen to cautious and sensible people, and not allow ourselves to think too highly of a tree that will perhaps only live three times as long as we do.”

Clearly Peattie’s arguments, unlike Dirr’s, are based on aesthetics rather than practicality. However, both writers limit their discussions to *Acer saccharinum* as they have seen it in cultivation. Indeed, most opinions of the species have been based on its behavior in situations where it would not naturally occur. Just because a plant is adaptable enough to grow on a certain site does not mean it should be planted there; and inappropriate siting appears to be a major source of silver maple’s present poor reputation.

A review of the literature shows that over the course of this century, the use of *Acer saccharinum* in cultivated landscapes, particularly as a street tree, has been viewed with increasing disapproval by “experts,” including those of the U.S. Department of Agriculture’s Department of Forestry. The species continued to be popular in both public and private landscape designs until well into the twentieth century—one of this century’s most celebrated landscape designers, Beatrix Farrand, considered it “the most graceful American hardwood, far surpassing any other tree.” Nonetheless, in theory if not in practice, a slow shift in attitude can be detected at the turn of the century.
A silver maple is at left in this lush planting by Beatrix Farrand at Dumbarton Oaks in Washington, DC.

The increasing negativity contrasts sharply with the literature of the preceding decades. A. J. Downing in his influential and multi-editioned Treatise on the Theory and Practice of Landscape Gardening (1841) not only included Acer eriocarpum (as silver maple was then known) among “the finest hardy Deciduous Trees,” he approvingly quoted François André Michaux:

In no part of the United States is it more multiplied than in the western country, and nowhere is its vegetation more luxuriant than on the banks of the Ohio. There, sometimes alone and sometimes mingled with the willow, which is found along these waters, it contributes singularly by its magnificent foliage to the embellishment of the scene. The brilliant white of the leaves beneath, forms a striking contrast with the bright green above, and the alternate reflection of the two surfaces in the water, heightening the beauty of this wonderful moving mirror, aids in forming an enchanting picture, which, during my long excursions in a canoe in these regions of solitude and silence, I contemplated with unwearied admiration.

—The North American Sylva, 1817

Thirty years later, in his 1870 The Art of Beautifying Suburban Home Grounds, Frank J. Scott, an influential authority on landscapes for suburban estates who counted himself among the disciples of Downing, wrote:

There ought to be but one variety of street tree on the same block, at least, and the longer the continuity is kept up the nobler will be the effect. . . . For wide avenues [where alone such great spreading trees as the elm, sycamore, silver maple, and silver poplar should be planted] . . . thirty feet is the least distance that any street trees should be planted from each other.”
E. H. Wilson photographed this picturesque silver maple in the valley of the Connecticut River, Massachusetts, April 1925.
But what Scott gave with his right hand, he took away with his left:

This native maple, so common on the banks of western streams, has become, perhaps, too great a favorite for street planting.

He found it wanting in comparison with the sugar maple; furthermore:

The head of the silver maple does not break into good masses of light and shade until it is old, and in the mean time the projection of its numerous spreading branches scatter the light on a great number of small points, and develop no broad, deep, or well-defined shadows.

But the author of the 1897 Lawns and Gardens: How to Plant and Beautify the Home Lot, the Pleasure Ground and Garden was not at all ambivalent; he nominated silver maple “the most useful and ornamental of our deciduous trees.” In 1905, with The Tree Book, the potential shortcomings of silver maple begin to dominate the literature:

The silver maple is a tree to count upon... It is a lazy man’s tree, for it comes vigorously from seeds, and bears transplanting, even when there are radical changes in soil and in climate to be met. It is a rapid grower, soon giving ample shade. But rapid growth implies brittle, weak wood, as a rule. Slow-growing trees like elms should always be alternated with soft maples, to replace them after their brief race is run.

In 1920, serious concerns were being raised by no less an authority than the U.S. Department of Agriculture. In that year, its publication on street trees included three objections to the use of silver maple:

The first is its brittle wood, which at an early age is easily broken by ordinary windstorms and causes it when a comparatively young tree to become unsightly. The second is its shallow rooting, which has a tendency to destroy pavements and also makes it difficult to grow grass near the trees. The roots also will grow into sewers. The third is a tendency to decay, the tips of

the limbs frequently die, leaving the whole top of the tree bare of leaves and the wood decays quickly, especially if the bark is broken. For this reason, it does not stand pruning as well as most other street trees, and it probably has been pruned more ruthlessly than any other tree, unless it is the Carolina Poplar.

These recommendations were seconded in 1922 by the president of the American Tree Association.

By the mid-1930s proponents of the species had to concede that “... [the] Silver Maple has fallen into disfavor for planting purposes, yet it still remains the most frequently met and best known of the maples.” In 1939, Cleveland municipal authorities noted with some exasperation that although the disadvantages of the species were well known, *Acer saccharinum* continued to be the most frequently used street tree:

... [its] only virtue seems to be that it is hardy in a city environment and is a fast grower. For the latter reason especially, and because it is cheap, it is the usual species chosen by the allotment operator for planting new streets, and outlying sections of the city are only too apt to carry on their newly developed tree-lawns a full quota of silver maples.

In that same year the Massachusetts Forest and Park Association simply omitted *A. saccharinum* from its lists of recommended trees. By the 1940s the omission from municipal plant lists was commonplace, and in some cases it appeared on lists of undesirable trees.

The major reason for silver maple’s fall from nineteenth-century grace into twentieth-century ill repute appears to be its indiscriminate use as a street tree. Scott’s recommendation in 1870 was predicated on a generous spatial allotment, and his image of a broad avenue with gracefully sweeping tree branches predated the now-ubiquitous powerline. The conflict between *Acer saccharinum* on the one hand and modern streets with their powerlines and confined planting spaces on the other was one that the tree could not win, since the pruning required to accommodate these new conditions would supposedly exacerbate its “weak wood” problem. Ironically, the very ability of silver maple to tolerate a wide range of soil and

Alfred Rehder photographed this silver maple in Jamaica Plain, Massachusetts in summer 1900 and again in winter 1904.
moisture conditions, together with its fast growth, contributed to overexuberant use of the species in situations ill suited to its other biological characteristics.

Interestingly, the British, who now use *Acer saccharinum* primarily as a specimen tree, have always been and are still enamoured of it. "The Silver-leaf Maple (*Acer dasycarpum*) is one of the most graceful of trees," the eminent British horticulturist William Robinson wrote in 1907. "[I]n early spring it is covered with myriads of reddish flowers; then its leaves, green above, silvery-white below, turn in autumn to a varied colour." On a current British website, silver maple is described as "by far the most successful of the eastern American Maples...it forms a bushy crown of attractive green leaves each spring, which seem to resist attack by insects better than other nearby trees." This characteristic may in fact be a clue to the most appropriate use of *A. saccharinum* in the cultivated landscape. Rather than relegate it to sites of "rugged conditions," as Dirr suggests, perhaps it should be positioned where it can grow and spread, protected from strong winds—the charmed circumstance of much of the British Isles.

The recent development of several cultivars may also encourage a reevaluation of the species. The most widely available is 'Silver Queen', which is nonseeding. Others—'Pyramidale' is one—possess a strong central leader for structural soundness. As Peattie says of it, they "impart to every streambank where they grow, to every big red Hoosier barn and little white house, to all the village streets and the long straight roads where they have been planted, an air at once of dignity and lively grace, a combination rare in a tree as in a human." And what can Dirr say to that?

**Bibliography**


Finlay's extended description of the species is as florid as Peattie's.


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Verdant Arches and Bowers: Artificial Adaptations of Trees

Frank J. Scott

The history of garden art is a history of ever-diminishing garden size. For centuries garden treatises have helped landowners adapt their ambitions to the realities of constricted places. Treatise writer and landscape designer Frank Jesup Scott (1828–1919) is best known as an influential promoter of post-Civil War suburban life and the now-requisite lawn. His book *The Art of Beautifying Suburban Home Grounds of Small Extent* was published in 1870, during the economic recovery following the war when more and more Americans aspired to live in what Scott termed “half-country, half-town,” “the happy medium and the realizable ideal for the great majority of well-to-do Americans.”

Back then, well before gardeners clamored for low-maintenance plantings, yardwork was serious, time-consuming business. As a student of Andrew Jackson Downing, Scott no doubt shared Downing’s belief that garden beauty reflects owner virtue. But Scott’s proposals in the section excerpted here appeal to those of us who love trees without concern for morality. A recommendation to plant more trees is convincing in itself, and the care required to train them into arches and bowers a small price to pay. As Scott put it, “Such arbors or arches can be made much more quickly with carpentry and lovely vines, but the permanent and more unusual structures made with living trees must nevertheless be more interesting.”
All weave on high a verdant roof
That keeps the very sun aloof,
Making a twilight soft and green,
Within the column-vaulted scene.

Alfred B. Street

ARTIFICIAL ADAPTATIONS OF TREES

All modes of growing trees for decorative or business purposes may be considered artificial, but what is here meant by artificial adaptations are those less common forms of culture, by which shrubs and trees are brought by skill, or persistent manipulation, into unusual forms for special purposes. Hedges, screens, verdant arches, arbors, dwarfed trees, and all sorts of topiary work, are examples of such arts. It is sometimes objected to these formally cut trees, that they are unnatural, and therefore inadmissible in good decorative gardening. But houses, fences, and walks are not natural productions, nor are lawns or flower-beds. All our home environments are artificial, and it is absurd to try to make them seem otherwise. The objection arises from a common misunderstanding that all decorative gardening is included in, and subject to the rules of landscape-gardening: an unfortunate error. The word landscape conveys an idea of breadth and extent of view, so that landscape-gardening means gardening on a great scale, in imitation of
natural scenery. All the effects that can be produced artificially with small trees, by topiary arts, may seem puerile as parts of a landscape; but in the dimensions of a small lot, where each feature of the place needs to be made as full of interest as possible, no such idea is conveyed. On the contrary, whatever little arts will render single sylvan objects more curious and attractive, or more useful for special purposes, may with propriety be availed of. It is as absurd to apply all the rules of grand landscape-gardening to small places, as to imitate, in ordinary suburban dwellings the models of palaces. The only limit to the use of topiary work of the character we are about to treat of is, that whatever is done shall be subsidiary to a general and harmonious plan of embellishment, and *that the forms employed shall have some useful significance.*

* * * * *

There is no limit to the charming variety of effects that can be produced by training and pruning trees and large shrubs, both evergreen and deciduous, into fanciful forms for gateway and garden arches, verdant pavilions, and bowers. As evergreens are most constantly beautiful for such purposes, we will first call attention to a few forms in which they may be used.

The hemlock can be treated as illustrated by figures 31, 32, and 33. The first represents two hemlocks which have been planted two feet away from and on each side of an ordinary gateway. After five or six years’ growth they may be high enough to begin work upon. A crotched stick about two feet shorter than the distance of the trees apart, is stretched from one to another, from six to seven feet from the ground, and fixed there to keep the tops apart up to that point. Above the stick, the tops (supposing that they are tall enough to admit of it) are to be bent towards each other until they join, then twisted together, and tied so that they cannot untwist. To do this so as to form a graceful arch, the trees must be about eleven or twelve feet high. After they are firmly intertwined at the top, which is usually in about two years’ growth, the clipping of the sides and tops can be going on to bring the arch to a form like that of figure 32, or to any similar design the proprietor may desire. An arch like the latter figure may be brought to considerable perfection in the course of ten years.

Figure 33 shows the probable appearance that a hemlock archway would present in twenty years after planting, supposing the trees were allowed to develop more naturally after their artificial character was well established. Such arches increase in quaint beauty as they grow old, and after the first ten years will need but little care.
Figure 34 is intended to show another effect, which may be produced with the same size trees, by joining and twisting together two side branches to form the arch, leaving the main stems to form two spiry sides, and trimming to produce this form.

Another mode that, if well executed, would produce a curious effect, is to unite the main stems as in the first mode, but instead of twisting them to grow vertically over the middle of the gate, the twist should be made horizontally, so that the tops would project sideways, as shown farther on for elm-tree arches [figure 40]. This in time would develop into a wide crescent, inverted over the arch, or it might be likened to a pair of huge horns guarding the arch. The variety of novel forms that such trees can be made to assume after ten or twelve years' growth will surprise most persons. The same kind of arches on a smaller scale can be made with the arborvitae, but the branches are not so pliable. It may be used to advantage for narrower and lower arches.

For arbors or bowers the hemlock is equally well adapted. We would suggest as the simplest form to begin with, that four hemlocks be planted at the intersection of two walks, say five or six feet apart. By cutting back the side branches to within one foot of the trunk, the growth at the tops will be increased so that in five or six years they may be tall enough to allow the opposite diagonal corners to be twisted together. If the trees are all thrifty, the twist will become fixed in two years. The fragrant and graceful foliage of the hemlock can thus be made to embower retired seats, or make quaint openings for diverging paths. Such arbors or arches can be made much more quickly with carpentry and lovely vines, but the permanent and more unusual structures made with living trees must nevertheless be more interesting.

The hemlock may be used to make artificial pavilions of a still larger kind if trained through a period of ten or fifteen years. Suppose six trees to be planted at the corners of a hexagon ten or twelve feet in diameter. Let them feather naturally to the ground on the outside of the group, and trim to within one or two feet of the trunks on the inside. When twelve feet high, pass a rope around the circle, on a level, two or three feet below their tops, so as to draw them towards the centre of the circle as far as the main stems may be safely bent, which will probably be about three feet inside of the perpendicular. If the circle is twelve feet in diameter, this will still leave six feet unenclosed at the top. The rope is to be left around them until the trees have grown five to six feet higher, when another binding will bring their tops together, and if they are long enough they may be twisted together.
Figure 35 is a section of the stems alone, to illustrate the general form intended. When the six trees are together at the centre they should be made to grow like one, and the branches that grow from the upper sides of the curved stems must be cut back to prevent them from becoming leaders. Figure 36 shows one development of this mode of training; the sides and top having been trimmed in mosque-dome form, the curve of the living frame of the pavilion being well adapted to produce it. It will require from twelve to fifteen years to perfect such a pavilion, but the group will be pretty, and interesting at every stage of its growth. In this, as in most other things in life, it is well to remember Shakespeare's lines—

What's won is done;—joy's soul lies in the doing.

A pretty variation of the above plan, for larger verdant pavilions, may be created by simply bending the tree-tops towards the centre in the manner above described, but not close together, leaving a circular opening six feet wide over the centre, in the manner of a dome sky-light.

The fir trees, though fine for lofty screens or hedges, have more rigid wood, and do not bear so much bending; still very beautiful results of a similar kind may be produced with the Norway spruce, which is the best of the firs for this purpose. It bears cutting quite as well as the hemlock.

The *Cypressus Lawsoniana* (*Chamaecyparis lawsoniana*) which combines a rapid growth, and the freedom of the hemlock with arborvitae-like foliage, will be an admirable tree for large works of this kind, if it continues to prove hardy.

The pines are mostly disposed to drop their lower limbs as they increase in height, and this peculiarity may be availed of in producing other forms of growth. If, for instance, it is desired to make an evergreen umbrage in which to take tea out of doors in summer, it may be provided by planting four white pines, say twelve feet apart each way, and when they are from eight to ten feet high, cutting their leaders out so as to leave a tier of branches as nearly as possible at the same height on the four trees.

The following year see to it that none of these upper branches turn up to make leaders, and if necessary tie them down to a horizontal direction. By attending to this for two years the top tier of shoots will make a horizontal growth, which will meet in a few years overhead, and form a table-like top of foliage. But to insure this effect, the tree must be watched for some years to
prevent any strong shoots from taking an upward lead, and thus draw the sap away from the horizontal branches.

After these have met overhead, and form a sufficient shade, the part above may be allowed to grow as it will. The check and change in the growth of the trees by such manipulation, carried on for several years, insures a novel and picturesque form for the group that will be permanent. As the white pine attains great size at maturity, it is not well to attempt such an arbor on quite small grounds.

Deciduous trees being more subject to insects on their foliage, are less desirable than evergreens for these uses, but they spread at the top more rapidly, can be more quickly grown to the required forms, and are covered at certain seasons with beautiful and fragrant blossoms; so that in variety of attractions some of them are unequalled by any evergreens. The latter wear throughout the year the beauty of constant cheerfulness, while the former, with the changing seasons, are alternately barren of graces, or bending with foliage and glowing with blossoms.

For archways there are no finer deciduous trees than the English hawthorns and the double flowering scarlet thorn, *Crataegus coccinnea flore plena* [C. pedicellata]. They can be planted at the sides of footpath gates, in the same manner as recommended for the hemlock, and it will only be necessary to trim them on the inside, so as to keep the opening unencumbered; as the hawthorns bloom best on their extended garland-like branches. But they should be trimmed enough to prevent any decidedly straggling outline, to show that they are intended as artificial adaptations for a purpose. Figure 37 shows a suitable form for a hawthorn arch.

For bowers, or umbrageous groups surrounded by open sunny ground, the same form suggested for hemlock and pines is adapted to the hawthorns; viz., planting in a square or circle so that the interior can be used for a cool summer resort for smoking or reading, a place to take tea, or a children's playhouse. A dense canopy of leaves forms the coolest of shades in the hot hours of summer days. To form such a canopy with hawthorns will require about ten years, and may be made by planting six trees in a hexagonal form. All our readers may not remember that if they make a circle of any radius, that radius applied from point to point on the circle will mark the six points of a hexagon.

The following varieties of hawthorn are recommended for five of these places, viz.: the common white, *Crataegus oxyacantha* [C. laevigata], the pink flowered, *C. o. rosea*, the dark red, *C. o. punicea*, the double red, *C. o. punicea flore plena*, the double white, *C. o. multiplex*, and for the sixth the double scarlet thorn,
C. coccinnea flore plena. These will in time make a bower of exquisite beauty in the time of bloom, and of such full and glossy foliage that it will have great beauty during all the leafy season. After such bowers are well thickened overhead by the annual cutting back of the rankest upright growth, they are interesting objects even in winter, by the masses of snow borne on their flat tops, and the contrast presented between the deep shadows under them, and the brightness of the snow around.

The hawthorns are all bushy when young, and their development into overarching trees will be somewhat slower than that of the following deciduous trees.

The sassafras is eminently adapted to form a useful bower of the kind above described, as it naturally assumes a parasol-like top, grows rapidly, and dispenses with its bottom limbs quickly. Being disposed to form crooked stems, some care must be used in choosing straight-bodied thrifty nursery trees, and protecting the trunks until they are large enough not to need it. Six thrifty trees will grow into a perfect canopy, of the size suggested, within five years, if their central stems are cut back, and kept to a height of about eight feet.

For the next five years all the upright growth at their tops should be annually cut back, so that the trees will not exceed twelve feet in height. Afterwards they may be allowed to grow naturally; but their greatest beauty will not be attained in less than fifteen or twenty years. Figure 38 shows the appearance they should make in ten or twelve years after planting.

Next to the sassafras, probably the judas or redbud trees, Cercis canadensis and C. siliquastrum, form most naturally into this kind of flat-roofed bower. The White-flowered dogwood, Cornus florida, is also adapted to the same use. Both spread lower than the sassafras, but do not grow so rapidly when young. The moose-wood or striped-barked maple [Acer pensylvanicum], on the other hand, attains the height required in a single season, and its green and yellow-striped bark is ornamental. The branches, after the trunk has attained the height of ten or fifteen feet, radiate naturally to form a flat-arched head, and grow much slower than the first vigorous growth of the stem would lead one to suppose. The foliage is large and coarse, but the form of the tree is suited to the purpose under consideration. Its large racemes of winged seeds, of a pinkish color, are very showy in August. The paper mulberry is also a valuable tree for such uses, and attains the required size and density of head in less time than any of the others. The foliage is unusually abundant and of a dark green color.
Perhaps the most beautiful of all small trees for such purposes is the weeping Japan sophora [now *Styphnolobium japonicum*]. It is grafted from seven to ten feet high on other stocks, and for many years its growth is slow; but if one will have the patience to wait, a more charming and curious bower can be made with a circle of sophoras than of any tree we know of.

We have named only a few of the trees which may be made use of for growing these artificial bowers. For very small grounds there are many arboreous shrubs which may be used to produce similar effects on the inside, and appear as naturally grown groups on the outside.

Elms may be used with good effect for arches of a larger growth than those already suggested. The adjoining sketch, figure 39, will illustrate one mode of procedure, where there is room for large trees. Two common weeping elms are to be chosen, each having two diverging branches at the height of six to eight feet from the ground, and to be so planted that the extension of these branches will be parallel with the fence. For a foot-walk gate-way, plant them about two feet back from the fence-line, and the same distance, or less, from the walk. After the trees have grown so that the branches towards the gate are long enough to be connected, as shown in figure 39, and upwards of half an inch in diameter, they may be brought together and twisted round and round each other vertically, and tied together so that they cannot untwist; or they may be grafted together as shown in the sketch above. The twist will, however, be the strongest and simplest mode.

The branches that proceed from the twisted ones below the union, must be kept cut back to within two or three feet, so as to encourage the strongest growth in the part above the twist. The next spring, if these united branches have done well, the outer branches of both trees may be cut off at a, a, and grafted with scions of the Scamston elm [a weeping form]. If the grafts take, and the growth and trimming of all parts are properly attended to, the lower growth forming the gateway arch should be all Scamston elm, crowned over the centre with a loftier common elm, presenting an appearance in the course of ten years something like the accompanying engraving.

The Scamston elm grows with great vigor in a horizontal and downward direction only, and its long annual shoots, and dark glossy leaves overlap each other so closely that an arch cut in one side has the
appearance of being cut through a mound of solid verdure. Their tops are flatly rounded like unfinished hay-stacks, and the common elm emerging from the centre (as shown in the engraving), bending its long arms over the former with a freer growth, might, we think, present a combination of grotesque grace less formal in expression than our illustration.

A broad flat-topped arch of a similar character may be made by grafting all four of the branches with the Scamston elm at a, a, figure 39, and the points opposite. This may be perfected more quickly.

For an archway over a carriage entrance two common elms may be planted by the sides of the gateway, and when their side branches are long enough, may be twisted round and round each other, and tied together, and the other parts of the tree trimmed to develop the best growth of the branches depended on to form the arch. Figure 41 illustrates the appearance of the trees without their leaves a year or two after the twist has been made.

U.S. POSTAL SERVICE
STATEMENT OF OWNERSHIP, MANAGEMENT, AND CIRCULATION
(Required by 39 U.S.C. 3685)

Campaign Approaches a Successful Conclusion

Robert E. Cook, Director

Charles Sprague Sargent was a remarkable fundraiser in his time, and after. He died in 1927, leaving behind a fifty-four-year record of contributions from friends and supporters. Their generosity added to the original bequest of $100,000 that came from the estate of James Arnold in 1872. Those same friends and supporters conducted a campaign following Sargent’s death that raised over $1,000,000 for a memorial endowment. During the next thirty years, large bequests from the Case family and from Martha Dana Mercer continued to benefit the growing programs of the Arboretum; but no formal, broad-based fundraising campaign was mounted until the last decade of this century. In 1994 we set a goal of $8,250,000 which, at that time, was considered very ambitious for an institution with no recent history of such an organized effort.

I am pleased to report that, as of November 1 of this year, we have raised $7,950,000 in pledges and outright gifts. Many of these gifts are intended by their donors to be added to endowments to support our research and education programs in perpetuity. I am confident that, sometime early in the new millennium, we will achieve the goal set five years ago.

The success of our campaign was anchored by three major gifts from long-time friends of the Arboretum. The family of George Putnam established an endowment of over $1,000,000 to support the award of Katharine H. Putnam Fellowships at the Arnold Arboretum for research and related activities that use our exceptional collection of shrubs and trees. The extended Hunnewell family pledged to raise $1,000,000 to support the renovation of our main facility, the Hunnewell Building, built in 1892 through the generosity of Horatio Hollis Hunnewell. Finally, an anonymous donor bequeathed the Arboretum a gift of $1,000,000 to endow the Horticultural Library in Jamaica Plain, thereby ensuring the continuing strength of one of Boston’s finest collections of botanical books and journals.

For the first time, our campaign was conducted as part of Harvard’s university-wide effort. As such, perhaps our greatest accomplishment is a reaffirmation of the Arboretum’s traditional mission to increase our knowledge of woody plants and to disseminate that knowledge through education, including public education. In executing this mission in a magnificent landscape open to the public, we serve as one of the university’s most important contributions to the people of greater Boston and lovers of trees worldwide.

New Translation of Willow Monograph

Irina Kadis, Curatorial Assistant

Willows have long been known as a difficult genus. Few beacons cast light on the seas of confusion surrounding them. Since 1968, Russian-speaking readers could turn to an excellent review of the genus Salix by the authority on catkin-bearing plants, Alexei K. Skvortsov. The idea of translating this monograph, which describes 135 of the Eurasian willow species, many of which also occur in North America, captured me more than five years ago in the library of the Arnold Arboretum. I came

continued on page 2
across a copy of the book in the original Russian, so familiar to me, but useless to everyone else. I had no idea how long it would take me to translate the book; indeed, I would never have completed this project were it not for the enthusiasm and friendly support I found on both sides of the Atlantic.

From the very beginning (and the beginning was the most difficult!), I was encouraged and helped at the Arboretum and even granted a trip to Finland when the University of Joensuu agreed to publish the translation as a part of their Faculty of Mathematics and Natural Sciences Report Series. This was not just a matter of good luck. A group of scientists working in Finland under the leadership of Jorma Tahvanainen had long been studying the taxonomy and ecology of willow communities. From their perspective, the need for the book was urgent and obvious. A Canadian botanist, renowned specialist on the willows of the New World and an old friend of A. K. Skvortsov, George Argus helped with the scientific editing of the translation. Alexei Zinovjev, an entomologist from St. Petersburg Zoological Institute who studies willows as host plants of insects, coordinated all the work in both hemispheres and also undertook the technical part:

compilation of computerized images of species distribution maps and layout of the entire manuscript. Luckily for me, Professor Skvortsov came from Moscow to Boston twice during these five years. Our discussions provided me with important insights.

Although some of the members of our international team never met, all the same, we worked efficiently. Thanks to the effort and commitment of Russian, American, Canadian, and Finnish scientists, Willows of Russia and Adjacent Countries is now available at University of Joensuu (mervi.kinnunen@joensuu.fi; ISBN 951-708-766-7).

Arboretum Council Fall Meeting

A visit to the site of the proposed Shrub and Vine Garden was one of the highlights of the annual fall meeting of the Arboretum Council, held on October 13, 1999. Council members discussed plans for the garden with Robert E. Cook, director, and Peter Del Tredici, director of living collections, as they reviewed the architect’s model and drawings. They then walked the site of the proposed garden. Other events of the day included a tour of Chinese Path and a presentation on the digitization of the Arboretum’s plant exploration records.

Staff Update

A series of recent staff changes and additions have occurred at the Arboretum. In the development department we have appointed Karen O’Connell, formerly membership coordinator, as development manager overseeing membership and the annual fund, as well as the finish of the capital campaign. We have asked Sheila Baskin, formerly secretary to several departments, to join the department as development assistant.

Sarah Carrier, who was hired in September to work at the front desk, has been asked to assist with the Institute for Cultural Landscape Studies one day a week as well. Sarah comes to the Arboretum from the Society for the Preservation of New England Antiquities (SPNEA), where she helped conduct plant inventories for their historic sites. Sarah earned her Bachelor of Arts degree in environmental geography from Clark University.
AABGA Visits the Arboretum

Ellen Bennett, Manager of Horticultural Information

Regional meetings of public garden professionals serve as important sources of practical information and as opportunities to network with peers. On October 28 and 29, the Northeast Region of the American Association of Botanical Gardens and Arboreta (AABGA) held its 1999 meeting. The first day of the conference was hosted by the Arnold, as 95 participants descended upon the site for a day of presentations on curation and landscape change over time. Speakers hailed from throughout, and beyond, the Northeast, including representation from the Connecticut College Arboretum, the Holden Arboretum, New York Botanical Garden, and the Olmsted Center for Landscape Preservation as well as this arboretum. After lunch in the Rose Garden, Arboretum staff led participants on tours of the grounds and gave demonstrations in the curation department and the Dana Greenhouses. The day ended with a wonderful reception at the Frederick Law Olmsted National Historic Site in Brookline.

The second day was hosted by Mount Auburn Cemetery in Cambridge. The focus of the day was master planning in the public garden realm, with speakers from Mount Auburn, Cornell Plantations, the Holden Arboretum, and Tower Hill Botanic Garden. Again, participants were treated to tours of Mount Auburn’s grounds, and a tour of Harvard Yard. After a marvelous closing reception in Harvard Yard, all agreed that the meeting had been a resounding success.

New Funding for School Programs

The education department has been awarded two new grants for the coming year to explore how the Arboretum might help schools create school-based, student-documented arboreta that would enable elementary students to use the trees in their schoolyards for long-term, inquiry-oriented studies. Our plan is to explore the issues related to such an endeavor during this school year in order to articulate and secure funding for a model program that could be used by schools nationwide. A pilot grant from the Boston Schoolyard Initiative (a public-private partnership that is supporting the redesign and construction of the schoolyards of Boston schools) will permit us to explore these teaching and learning issues in partnership with the Hale School. Our work with teachers at the Hale School will center on ways that a schoolyard arboretum—specifically, the initial selection, placement, and documentation of a collection of trees—can become part of the science curriculum. We anticipate that our National Science Foundation-funded project, Seasonal Investigations, can then be used in subsequent years to support continued observation and documentation of those trees.

A planning grant from the National Science Foundation will help us leverage this pilot study by allowing us to create two prototype technology tools designed to support tasks related to the creation and documentation of an arboretum. The first tool will help students to make informed decisions about trees to include in their schoolyard arboretum by allowing them to search out specific variables, such as drought tolerance or bloom schedule. The second tool will help them organize their data about each tree and allow them to keep detailed records that can be used by subsequent groups of students over time.

We believe that these efforts will help us develop a model for the creation and documentation of a schoolyard arboretum that can become useful for schools across the country. We look forward to the new challenge that this idea offers. For more information about this project, please contact Candace Julyan at 617/524-1718 x 109.
During Peter Del Tredici’s six-month sabbatical at Harvard Forest, Tom Ward, greenhouse manager and plant propagator, is serving as interim director of living collections. In addition, with a number of major projects on the grounds coming up, we have opened a new position for a landscape project manager and have appointed Laura Tenny Brogna, who was a Putnam Fellow, to that position. Laura will also be working on projects for the Institute for Cultural Landscape Studies. Finally, we have asked Irina Kadis, curatorial assistant, to increase her hours to provide additional time working in the herbarium at the Arboretum.

Staff additions in Cambridge include a new Putnam Fellow, Dr. Lisa Schulthies who will arrive in January from Berkeley to work in the laboratory of Michael Donoghue, using the living collections here, specifically, the genus Ribes. A Mercer Fellow, Dr. Hans-Joachim Esser will be arriving from Germany in March to conduct systematic studies and collecting expeditions. We are also adding a new staff member, Dr. David Middleton, as tropical plant systematist, in November.

Recent Construction Improves Neighborhood Conditions

Laura Tenny Brogna, Landscape Project Manager

Representatives of regional and local water agencies and their construction crews were in abundance on the Arboretum grounds in recent months. The best evidence is the new stormwater collection system designed and constructed by the Boston Water and Sewer Commission (BWSC) and Feeney Brothers Excavation Corporation of Dorchester.

Improvements were directed by the City of Boston to correct inadequate drain systems that have been overloaded in heavy storms, contributing to past flooding in the neighborhood of Archdale Road, near Peters Hill. The low-lying houses and roads were built on filled wetlands in the 19th century; that plus the confluence of several regional and local wastewater pipe systems have made the area highly vulnerable to flooding.

The work was simple in concept, difficult in execution. First came the excavation of a large, crescent-shaped, earthen basin for collection of stormwater runoff from Peters Hill. Then two pipes, 30 inches in diameter, were installed at the low end of the basin to divert water from the Archdale Road neighborhood. Instead, it carries water under South Street and releases it into the low-lying land by the railroad bed (in the area known informally as the South Street Tract of the Arboretum). About 300 feet of 36-inch concrete piping was required to help the water over and beyond a rise in the land in the South Street Tract.

A plus for the Arboretum in this operation was the removal of several truckloads of rubble that were deposited there in the 1980s during construction of the Forest Hills MBTA station. The construction also gave us the opportunity to rebuild the stone wall at the base of Peters Hill; some of the large granite blocks were salvaged from work on the Big Dig. In the process, stone steps were placed in the wall to accommodate neighborhood residents who previously had to scale it to enter Peters Hill. Structural repairs are now complete and regrading and other clean-up work should be finished shortly.

Just as construction was finished, tropical storm Floyd blew in to test the system. BWSC and Arboretum staffs were pleased to see it operating well during and after the storm; several feet of water collected in the South Street Tract.