Spring/Summer 2015

news,
classes &
visitor guide

Silva

The ARNOLD ARBORETUM of HARVARD UNIVERSITY

Forests of the Asian Tropics:

Where Ancient Traditions of Respect Are Embattled But May Yet Prevail

A Talk by Dr. Peter S. Ashton

Former Director of the Arnold Arboretum and Arnold Professor of Botany; Charles Bullard Professor of Forestry, Emeritus, Harvard University

Saturday, May 16, 3:00–4:30pm in the Hunnewell Building

Peter Ashton has spent a career spanning nearly six decades focused on tropical forest health and dynamics, plotting change over time in forest composition around the world. His efforts and the data collected across decades reveal proof of changing climate, and population pressure and resource demands by humans on ecosystems. His collaborative efforts have shown the catastrophic loss of tropical rain forests, which retain some of the greatest species and genetic diversity on land. An expert in the Dipterocarpaceae, a pantropical family of large, buttressed hardwood trees, Ashton did much of his forestry field work in Southeast Asia, most often on the island of Borneo which holds the greatest species diversity of this family and some of the greatest floral diversity of the world.

Join us on May 16 to learn about Peter's decades-long conservation efforts and celebrate the publishing of his book, *On the Forests of Tropical Asia*, the first comprehensive account of all the forests of one tropical continental region.

Peter Ashton first entered the forests of tropical Asia in 1957 as Forest Botanist in the Omar of Brunei's government and spent an additional five years as Forest Botanist in the Sarawak government. After serving in the botany faculty of Aberdeen University, he was appointed Director of the Arnold Arboretum and Arnold Professor of Botany, and later Bullard Professor of Forestry at Harvard University, retiring in 2000. He is a Japan Prize laureate for his contributions to the conservation of tropical forests and recipient of many other awards including the Linnean Medal for Botany and the David Fairchild Medal for Plant Exploration. He shared UNESCO's Sultan Quaboos Prize for Environmental Preservation in 1997 for activities in forest conservation and sustainable management of natural forests, in connection with the Sinharaja Biosphere Reserve and World Heritage site.

Register Online for this Special Event

Visit us online at my.arboretum.harvard.edu to register for this free talk. Priority registration for members through April 15; general registration begins April 16.

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Cover
Eastern redbud (*Cercis canadensis*) and flowering dogwood (*Cornus florida*) on Oak Path by William (Ned) Friedman

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From the Director

An exciting new discovery by mycologists of a previously undescribed species of truffle in North America. An effort by landscape design students to map the shifting hydrology, ecological cycling, and natural succession of plants in an urban watershed. Entomologists focused on unraveling the mechanical secrets of dragonfly wings, to better understand how insects perform their complex flight behaviors in nature. Robotics researchers using remote sensing technology to classify and identify terrain. The first microbiome of a tree (a *Ginkgo*, no less).

What unites this remarkably diverse set of endeavors? All were among the 175 studies conducted over the past five years in the landscape and collections of the Arnold Arboretum of Harvard University, in keeping with our mission to enrich human knowledge, open new intellectual vistas for students, and contribute to our understanding of the world and our responsibilities as its stewards.

Since the opening of new facilities for research at Weld Hill, we have expanded the Arboretum's historical role in conducting and supporting investigative science, not all of which bears directly on the biology, evolution, or horticulture of woody plants. The fact that the Arboretum is so many things at once—a cultural landscape, an urban forest, a common garden, a testing ground for expanding the frontiers of botany and horticulture—means that it also possesses the environment and raw materials to explore an infinite number of inquiries.

In this issue of *Silva*, you will meet Assistant Professor Lizzie Wolkovich, one of three Harvard faculty whose research programs are now based at the Arboretum. Lizzie's work aims to improve our predictions of how plant communities are being—and will continue to be—affected by climate change. You will also meet Chris Roosevelt, an archeologist from Boston University and one of the many guest scientists who uses the Arboretum to advance his field work and teaching. Congruent with our new research facilities, our horticulture and curatorial staffs have endeavored to make our plant collections more accessible to research topics across the spectrum and to assist scientists from around the world. Our Plant Records Manager, Kyle Port, shares news of our first completed cycle of enhanced field check and collections verification procedures, designed to reassess each of our more than 15,000 accessioned plants on a five-year cycle.

The biodiversity catalogued and conserved in our landscape not only supports a wide array of scientific activity, but also inspires the many creative and compelling ways that we invite you to explore and appreciate the world of plants and nature. Check out some of our classes, workshops, and tours on offer this spring, as well as special exhibitions, Collections Up Close events, and Tree Mobs. And of course get ready for our annual celebration of spring and horticulture—Lilac Sunday—attended by an astounding 40,000 visitors last year. We look forward to sharing all this and more with you at the Arnold Arboretum—your multifaceted gem in Olmsted's Emerald Necklace—here for you to discover anew every day of the year.

—William (Ned) Friedman, Director of the Arnold Arboretum & Arnold Professor of Organismic and Evolutionary Biology, Harvard University

The Race for Spring

The interplay of plant life cycles, plant communities, and climate change—an interview with Elizabeth Wolkovich, Assistant Professor of OEB

With Jon Hetman, Director of External Relations and Communications

One of the effects of climate change that concerns ecologists is an apparent rise in invasive species in environments, and the destabilizing effect this can have on native plant communities and the natural systems they support. Understanding how and why some species become invasive in particular habitats but not in others is complex, but an important matter for conservation and for predicting how ecosystems will function in the future. Some biologists—like Elizabeth (Lizzie) Wolkovich at the Arnold Arboretum—suggest invasive species may get a leg up in environments by exploiting unused resources in an ecosystem, becoming established before native species each season or by responding more rapidly to variability in climate. This line of research focuses on the science of phenology—the annually recurring calendar of organisms' life functions, like when plants break dormancy in spring then leaf out, flower, or set seed. Working with a number of collaborators across a variety of disciplines, Lizzie's research concerns basic phenological questions such as how sensitivity to temperature, insolation, and precipitation varies between species and across latitudes, and whether climate change experiments can predict historical shifts in seasonal timing.

Lizzie's interest in science and the natural world began in her childhood, watching programs like NOVA on public television and admiring scientists who worked in the field with backpacks. She studied biology as an undergraduate at Wellesley and minored in Russian, developing an affinity with languages that would include studying abroad in Mexico. She continued her biology studies as a graduate student at Dartmouth, performing field investigations on invasive grasses and their effect on both arthropod and plant communities throughout the southern California scrub habitat. Upon completion of her Ph.D at Dartmouth in 2009, Lizzie continued her studies of ecology and invasion biology in southern California, first through a postdoctoral grant from the National Science Foundation completed at the University of California, San Diego. These experiences touched off an interest in how invasive biology is influenced by phenology. She continued this work at the University of British Columbia in Vancouver until her arrival at the Arnold Arboretum in January 2014, as a member of the faculty in the Department of Organismic and Evolutionary Biology (OEB) at Harvard University.

Q. Much of your graduate and post-graduate work focused on the biology of invasion—how exotic plants enter and gain advantage in plant communities. How did your research in this arena come to focus on phenology?

A. The work I did in California with invasive grasses got me particularly interested in their phenology, because it was quite distinct. They started and died earlier than all the major native plant species, so they created these very extreme ecosystem and temporal shifts. This got me interested in whether this difference in the timing of their life cycle events gave them an advantage as invaders in this system. In invasion biology we spend a lot of time looking for what appears to be a consistent reason why a plant gains traction in a new community, and phenology is one of the few plant traits that seems to correlate consistently across regions. For some species it doesn't seem to influence their ability to succeed, but for a large number it appears to be an important trait.

As I began to compile and analyze both historical and contemporary data on plant cycles, I discovered that some very basic questions—even more basic than this question of invasions—hadn't been answered in phenology. Additionally, I realized that very few people had looked across a lot of different sites at what was happening to wild populations due to climate change. That sparked my analysis of just how much plants and plant communities are shifting their phenology across North America and Europe, which is of major importance to designing future climate change models.

Q. Your work incorporates data collected on plant cycles from Europe and North America, the former reaching back hundreds of years. What do these data sets tell us in terms of what has already occurred in terms of shifts in phenology?

A. For long-term records in the temperate zone, there is a distinct change toward earlier phenology—earlier leafing and earlier flowering, especially for the early-season species, across northern North America. We know that plant phenology on average has advanced four to five days for each degree of warming. In the Boston area we've seen extreme warming because it is an urban heat island, and this is reflected in the data from 1900 or even before. Boston has warmed in the neighborhood of 1.7 degrees Celsius and spring phenology has shifted at least several weeks earlier in the past 30 or 40 years.

Jon Hetman

Lizzie Wolkovich, participating in a field excursion for researchers last fall at the Arnold Arboretum's Case Estates in Weston, MA.

Q. How does this shift toward earlier springs appear to be affecting plants and plant communities?

A. We discovered there is a large set of species—over 70 percent—that have shifted their phenology timing sooner, compared to 30 percent that have not changed at all or had actually delayed their timing. Those that apparently have not changed their timing over the past 40 years actually seem to be quite sensitive to *both* winter chilling and spring warming. So as winters are getting warmer, it is taking longer for these plants to fulfill their chilling requirement before breaking dormancy; at the same time, springs are also getting warmer, which speeds up the spring requirement for warmth and makes plants want to flower faster. These two occurrences are offsetting each other in some species; so while they don't appear to be affected by climate change based on their phenology, they are actually responding quite significantly, which likely will lead to a very dramatic change eventually.

In terms of plant invasions, our investigations found evidence that invasive species in the temperate zones throughout Europe and North America do appear to be gaining a foothold through phenology. Because the seasons are changing so dramatically with much longer growing seasons, a lot of the exotic species can track that change more quickly, significantly shifting their leafing and flowering time. We think they may be beating native species to the punch by taking advantage of resources earlier.

Q. What do you think may be driving this variation in how different plants respond to warming, and how are you investigating this?

A. Part of my hypothesis considers the inherent differences in species based on their evolutionary history. There is a certain amount of inertia in how different species are from one another based on their evolutionary history, and I think this might explain some of the variation we see in their responses to climate change. However, the bigger issue is that phenology has been looked at as a singular aspect of a plant, whereas we can infer from a great deal of research that plants tend to have more of a trait syndrome. There appears to be this fundamental trade-off with phenology—it is possible that species that have "cheap" leaf and wood tissues that they can readily replace can get started growing and reproducing quickly in spring, but these traits impede their ability to compete for resources with plants with later phenology and more robust tissues.

One of the big issues with phenology is that it can vary dramatically over a species range—the same species of maple will leaf out earlier in Boston, for example, than in areas farther north where it warms later. So we are collecting our own data to answer trait questions—I think it is critical to look across sites to see how the same species may be shifting relative to their particular environment. Currently we are working at Harvard Forest just north of Boston and at a site about an hour north of Montreal in Quebec, **(Continued on page 10)**

Natural State Natives

Michael Dosmann

A collaborative expedition sourced plants from the Ozark and Ouachita Mountain regions of Arkansas—an area of interest for Arboretum plant collectors since the time of Charles Sprague Sargent

Michael S. Dosmann, Ph.D, Curator of Living Collections

There is something to be said about studying and collecting plants from the wild. No matter how detailed a species description may be in a published flora, the written word always pales in comparison with what you gain by encountering a tree in nature. Seeing firsthand the diverse habitats where the more common plants dominate, or the peculiar spots where the rarities grow, can be truly enlightening, particularly in planning future planting sites for the species back at the Arboretum. Likewise, while a certain shrub may dazzle when planted in the garden, it may fade into the scrub while in the wild, illustrating how good horticulture can enhance a species' genetic potential. It is like finding a diamond in the rough.

As a curator and plant fanatic, these are all good reasons to seek new plants from their native habitats—to say nothing of how crucial a wild pedigree is to increasing a plant's value to science. Thus the Arnold Arboretum continues to mount annual expeditions in search of viable germplasm—seeds, cuttings, and even seedlings—from wild populations. Last fall for a week in early October, I joined fellow plant explorers Anthony Aiello (Director of Horticulture and Curator at the Morris Arboretum of the University of Pennsylvania), and Timothy Boland and Ian Jochems (Executive Director and Horticulturist, respectively, at Polly Hill Arboretum on Martha's Vineyard) on a collecting expedition in Arkansas. Rounding out

our team was Arkansas Natural Heritage Commission Botanist Theo Witsell, whose intimate knowledge of local flora proved invaluable.

Arkansas' nickname (The Natural State) is no ruse. A largely rural state punctuated by a few large cities like Little Rock and Fayetteville, Arkansas offers abundant natural areas spanning the bottomlands of the southeast to the highlands of the northwest. It was this latter region that we explored, particularly the lowland forests of the Ouachita and Ozark Mountains. This area—which includes the Ozarks' extension into Missouri —features high botanical diversity and has historically yielded wonderful additions to the Arboretum. Living collections from the region can be traced back to founding Arboretum director Charles Sprague Sargent, although perhaps the most notable derive from botanist Ernest Jesse Palmer's numerous expeditions in the area.

Anthony Aiello

Above, Michael Dosmann holds one of the plants targeted in an autumn expedition to Arkansas—seedlings of *Planera aquatica*, or water elm. ***Left***, Middle Forks Barrens Natural Area near Hot Springs, Arkansas, one of the team's collecting sites in the Ouachita Mountains region.

Armed with a wish list or desiderata established ahead of the trip, our team visited natural areas known to harbor populations of specific plants. Advanced planning can go a long way in making an expedition successful, and our efforts were rewarded through collections of 34 different species, including 13 not represented in the Arnold Arboretum's living collection. These additions are a boon to our efforts to broaden the species diversity of our holdings. Furthermore, we have an institutional priority that for each species grown, it should be represented by at least one accession of documented wild origin. The trip yielded additional species that fall into this category, bringing with them their native backstories and increasing their usefulness as individuals for study. Included in this group are *Itea virginica*, a shrub known as Virginia sweetspire, and *Quercus lyrata*, the overcup oak.

Even when the Arboretum's collection already holds documented wild-origin material of a species, there can be additional value in broadening the genetic diversity represented in cultivation. An example from this trip is the Ozark witchhazel, *Hamamelis vernalis*. Even though the Arboretum described this species some 100 years ago from a Missourian lineage (read the full story in Andrew Gapinski's article in *Arnoldia* 72/2), the representation of this significant winter-blooming shrub in our collections remains limited. We made collections of this species from three distinct areas, and look forward to many years of studying the variation among them. Another notable plant we collected was the maple-leaved oak, *Quercus acerifolia*. Originally discovered by Palmer in 1924 on Magazine Mountain in Arkansas, this species is considered one of the rarest oaks in North America. Our group visited one of four known remaining populations to investigate its status in the wild and to collect herbarium vouchers and acorns.

Whenever possible, a multi-institutional trip like this one offers an ideal approach. For one, it makes fiscal sense to share direct costs, like renting a suitable vehicle for transportation to and between sites. There is also the adage that "many hands make light work," and sharing job responsibilities and expertise before, during, and after the expedition ensures both efficiency and success. It is important to note that the majority of the work only begins after the trip is over—seeds need to be cleaned and sown, herbarium specimens processed and mounted, and the important trip journal and reports written and published. Additionally, because multiple institutions grow the resulting plants, there is an automatic insurance policy in case some seeds fail to germinate or seedlings do not grow well at one of our institutions—duplicate seedlings or even cuttings from the original can be redistributed in future years to gardens that need them. In coming years, there will be much for us to learn and enjoy by seeing how these plants from the Natural State grow and perform under Bay State conditions.

STEM BY STEM

The Arboretum Curatorial Team Completes a Comprehensive, Five-Year Census of the Living Collection

Kyle Port, Manager of Plant Records

Curatorial achievements can be measured on varying timescales. During the growing season, days are spent collecting fruit and flower vouchers for the Cultivated Herbarium. Weeks may be devoted to collecting new seeds and seedlings from wild populations in far-away places. Months of meticulous transcription move handwritten archives from the nineteenth and twentieth centuries to the digital realm. And, as we now celebrate, five years of field work yield up-to-date plant inventories—a comprehensive census encompassing the entire living collection of the Arnold Arboretum is just completed.

While our field work is steeped in tradition, the level of scrutiny given to each plant now follows a robust written protocol—a *Plant Inventory Operations Manual* written in 2010 and updated in 2011. Our goal was to surpass previous high standards, dedicating additional resources to properly assess performance, take new measurements, and coarsely verify every plant in the permanent collection. To accomplish this, we used a live connection to the database for the first time and cataloged observations digitally in the field. Perhaps most impactful has been the appointment of a Curatorial Fellow who assists field-checking duties for the entire year. Revamped methods and new technologies kept our eyes on the collections more over the past five years than ever before. This has led to better label, map, and observational data resources on the surface, while beneath it has led to a more intimate understanding and appreciation for the plant collections and their value.

Beginning with an American beech (*Fagus grandifolia* #26-80*A) near the southernmost point of the Arboretum and ending with a cucumber tree (*Magnolia acuminata* #487-40*A) at its northern edge, every one of our nearly 15,000 accessioned plants has been observed through this new approach. We enter the landscape armed with a laptop computer to catalog observations, and tools to adjust plant labels and measure the diameter of each tree stem at breast height. Maps depicting plants, contours, landscape management zones, and hardscape features guide the way and are annotated with follow-up tasks. These may include label needs, the capture or recapture of GPS coordinates, or follow-up for identity verification. After field-checking each area, a walk-about with collections managers and horticulturists often follows to summarize curatorial work and inform next steps.

Kyle Port

A total of 10,184 anodized aluminum records labels were twisted around branches or attached by basal screws over the Arboretum's first five-year inventory cycle (2010–2014). An additional 402 trunk labels (***above***) and 340 stake mounted labels were deployed within named garden areas.

Kyle Port

Above, Curatorial Fellows Joyce Chery (2013) and Jordan Wood (2014) study the flower mophology of a Nantucket serviceberry (*Amelanchier nantucketensis*) near Dawson Pond to verify its identity. Taxonomic verification of accessioned plants is an important element of regular field checks, particularly for endangered plants like *A. nantucketensis* held in conjunction with the Center for Plant Conservation.

While curatorial staff lead the formal inventory work, horticulturists and researchers also log important, *ad hoc* observations to our databases. In addition to an objective health assessment of a plant's condition, many other types of observational data are collected. These include phenology (e.g., flowering, fruiting, autumn color) as well as notes on habit, structure, injury response, hazards, pests, diseases, ornamental merit, floral fragrant notes, and—in the case of select crabapple specimens—fruit flavor profiles. Remarkably, during this past inventory cycle, more than 38,000 different types of observational data points were catalogued by the field check team. Taken together, these data inform a multitude of collection management decisions and assist researchers in their independent investigations now and well into the future.

Another hallmark of the last half-decade of inventory work has been our documentation of existing, yet unaccessioned plants in our landscape. While many of these "witness plants" are depicted on our various archival map resources, very little if any additional information had been collected on these plants over time. Some were spontaneous since the Arboretum's founding, many predate it. To ensure a regular cycle of inventory and to increase their value to research, more than 600 previously undocumented plants were officially accessioned.

Five years ago we aspired to change the way we inventory our living collection for the better. We accomplished this, and with the completion of our first comprehensive census, our plants are rendered in finer detail than at any time in our history. We look forward to sharing more of our work and discoveries with you—find us inventorying collections on Peters Hill this spring!

Anatomy of an Arnold Arboretum Plant Label

Ideally, all accessioned plants in the Arboretum's living collection bear two anodized aluminum record labels, which carry essential identification and inventory information of interest to scientists and visitors alike. From the top, you'll find the **accession number** with letter qualifier (denoting individuals of an accession) along with the **family name**; **botanical name** of the taxon; an abbreviation denoting the **means of propagation** (e.g., SD means "seed"), **lineage number** (for plants descending from historical accessions), and **accession year**; **provenance information** including source and collection data; **common name** if applicable; and the **grid location** of the plant according to the Arboretum's mapping system. Look for these tags hanging from a low-lying branch or stem, attached by a basal screw at ground level, or tied to an adjacent stake. If a tag cannot be found or is missing, you can also access this information and additional resources on your smart phone by pinpointing your exact location in the landscape using the Arboretum's interactive map application, Arboretum Explorer [http://arboretum.harvard.edu/explorer/].

Kyle Port

Mapping the Past

Using technology instead of excavation, archeology students investigate Arboretum landmarks

Chris Roosevelt, Associate Professor of Archaeology, Boston University

Ever wondered as you walked along Beech Path what those ruinous stone walls beneath Bussey Hill are doing there? Or, as you circled the southwest slope of Peters Hill, why there are so few grave markers in the Walter Street Burying Ground? If so, then you share an interest not just in the living collection of the Arnold Arboretum—its *sine qua non*—but also in the cultural heritage that helps make it the rich and varied landscape it is today. Yes, in a city known for its deep history, even this great green gem of Olmsted's Emerald Necklace is rife with a significant human past in addition to its arboreal present.

Or perhaps you just wondered what that gaggle of students was doing on a handful of sunny days over the past two fall semesters, as they walked around those walls and headstones with fancy-looking survey instruments. The students were graduate and undergraduate participants in The Lay of the Land: Surface and Subsurface Mapping in Archaeology, a course taught though Boston University's Department of Archaeology. With Arnold Arboretum support and guidance, the course took advantage of one of the most picturesque archaeological landscapes Boston has to offer to provide instruction in methods of archaeological surveying.

Among several sites of prehistoric and historical archaeological significance in the Arboretum, the Walter Street Burying Ground is perhaps the most conspicuous. A cemetery established in the early eighteenth century in association with the Second Parish of Roxbury, it served local residents as well as Revolutionary War dead. The widening of Walter Street in the early twentieth century truncated its extent, and only a small selection of its original grave markers are identifiable today, with those of Anna Bridge (d. 1722) and Katharine Mayo (d. 1857) chronologically bookending the remaining markers. How many markers were there originally? We can't be certain, but 49 were documented in 1854, and 35 were still visible in 1902. Only 14 markers are identifiable today in addition to a three-part crypt. Previous studies had located the surviving markers on the map only generally, so the goal for students was to provide the Arboretum an updated and accurate survey as well as a virtual archive of each marker in its current state of preservation. The survey revealed no significant new discoveries—the 14 newly surveyed markers correlate well with the 1902 map showing 35 markers—yet the image modeling of the remaining headstones now provide a 3D, virtual archive of monuments that have already suffered significant attrition.

Chris Roosevelt

Students of Chris Roosevelt's Boston University course in surface and subsurface archeological mapping employ surveying equipment as part of their investigation of the Walter Street Burying Ground.

The site between Bussey Hill and Beech Path is less well known. Those familiar with Arboretum history, though, will know that the standing Roxbury Puddingstone foundations of a barn and the grassy berm before it mark the core of the early nineteenth-

century agricultural estate—complete with manor house, outbuildings, and lavish landscaping with artificial ponds, roads, and paths—of Mr. Benjamin Bussey. Following its bequest to Harvard University, Bussey's "Woodland Hill" estate became the canvas on which George Emerson, along with his co-executors of the will of James Arnold, painted the ambitious idea of an arboretum for Harvard University.

The mansion of the eponymous hill and "Bussey Mansion Site," as it is now called, stood into the 1930s, but no traces of its structure remain above ground today. Because its general configuration is known from contemporary maps yet remains invisible from the surface today, it is a perfect training site for archaeological prospection using geophysical methods to delineate subsurface remains. The results of our electrical resistance survey at the site pinpointed the location of the mansion's high-resistance, doubled-square foundations of stone, marking the line of its first-floor house walls and wraparound porch edge, as well as traces of the road known to have led behind it towards the structure labeled as a barn on 1930s maps.

These past two autumns in the Arboretum have thus enabled excellent opportunities for student training in cutting-edge archaeological mapping methods just as they have, we hope, provided the Arboretum confirmation, if not new discovery, of its historical and archaeological treasures. Working with students in this wonderful corner of nature's classroom was so enjoyable and effective that one can only hope that such training and research opportunities will continue, even if they focus primarily on the Arboretum's lesser-known, "non-living" collections.

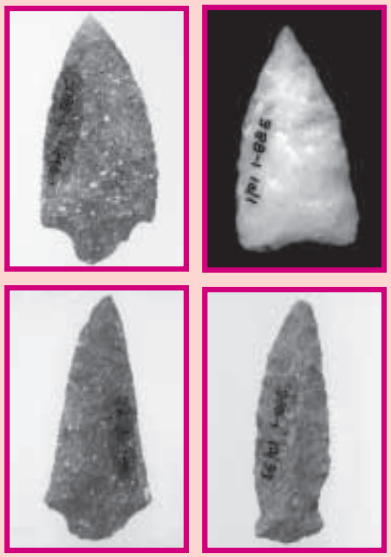
From the Arnold Arboretum Archives

Palmer-Fordham Collection of Native American Artifacts

Our Archives serve as the repository for institutional records and personal papers associated with the history and operations of the Arnold Arboretum. Additionally, we curate a small collection of objects which includes a number of artifacts crafted by indigenous peoples. These materials were discovered in our landscape by Arboretum Collector-Botanist Ernest Jesse Palmer (1875-1962), Plant Propagator Alfred J. Fordham (1911-2000), and other staff members since the 1920s, often turning up as a result of natural disturbances like storms or our more routine activities of planting and removing trees and shrubs.

Over the years, the collection has been researched by scholars specializing in the material culture of New England's indigenous peoples, and their analyses have identified the ages of the points and tools found here. The eight earliest artifacts—all projectile points—date to the Middle Archaic Period (8000-5000 years Before Present or BP), and reflect seasonal hunting activities on bird migration routes. The Late Archaic Period (5000-3000 BP) saw a warming of the environment and an increase in population by immigration of indigenous peoples from the south and west. Our 38 projectile points from this period reflect a growing and diverse populace here and suggest the land was used for hunting game such as deer and turkey. The limited quantity and distribution of lithic materials from the Woodland Periods (ca. 3000-400 BP) reflects the movement of indigenous peoples from the uplands of the Arboretum landscape to the coast, when this region was used primarily for inland hunting trips. During the Contact Period (400-200 BP) we have documentary evidence by European settlers that indigenous settlement was centered along the Neponset and Mystic Rivers. From this era we have found several gunflints, signifying a shift in how game was pursued here in Colonial times.

Although these artifacts are iconic and evocative, their removal outside of a wider archeological context must be considered in assessing their true historical value. However, their discovery in the closed, undeveloped environs of the Arboretum gives them a greater significance than if they had been collected randomly in Boston. The collection is available for study in the library, and you can read the finding aid for this collection in the Archives section of our website. ***—Lisa Pearson, Head of the Library and Archives***



Arnold Arboretum Archives

Above, a selection of the stone projectile points drawn from the Palmer-Fordham Collection of Native American Artifacts, arranged clockwise from top left by age: Neville Variant projectile point, Middle Archaic Period, grey felsite; Squibnocket Triangle projectile point, Late Archaic Period, quartz; Orient (?) projectile point, Early Woodland Period, grey felsite; Fox Creek projectile point, Middle Woodland Period, pink banded felsite. Read more about the collection in a 1934 article by Ernest Palmer, reprinted in *Arnoldia* 31/3 (see *Arnoldia* online).

(Continued from page 3) and this year we will set up two more sites in between. We're focusing on 35–40 species that all occur naturally at each of these sites, measuring their phenology along with a host of other traits we think may be highly correlated to phenology. What I think we'll find is that while phenology is one critical element in the equation, there are other suites of traits that shift along with phenology that make species better invaders.

We've also seen that species that tend to track climate change well tend to change the most in their timing with warming, outperforming species that either tend to not track climate change or delay their leafing and flowering. All of these findings are probably due partially to phenology and partially to the reality that phenology is a really complex functional trait that correlates with a lot of other characteristics of plants.

Q. As you continue to conduct your observational studies in the field, what experiments are you conducting in the laboratory to investigate phenology and response to climate?

A. My lab uses two different approaches to try to capture very robust and coherent data that minimizes cross-site or cross-seasonal variation in capturing the real expression of phenology for a particular plant. One involves forcing individual cuttings of branches of each of these species in the growth chambers at Weld Hill. Here we can use varying conditions like warmer environments and shorter or longer periods of light, to try to understand the triggers that determine phenology at each of these four different sites. The second approach directs us to plant the same 40 species gathered from each of the four regional test sites in one place to see how their phenology varies—we will be setting up this experiment this spring in raised outdoor beds at Weld Hill. As these plants mature over the next five to ten years, we expect to see a latitudinal gradient in when they leaf out.

Q. Why do you think climate change remains somewhat controversial in the public sphere, when the scientific opinion has been so consistent?

A. Generally speaking, I think people tend to think about climate change in terms of short periods of time—last year spring came very late but the previous year it started quite early, which is really climate variability not climate change. The climate system of the Earth, particularly in New England, varies significantly from year to year. You can certainly see variation of perhaps three to four weeks for the start of spring, which isn't unexpected. When we look at the data, however, we can see that normal variation, but within that variation is a very dramatic trend toward earlier springs. A more accurate way to view climate change is my grandfather remembering growing his garden on average starting in mid May, and now two generations later I'm starting mine in April. It's these generational comparisons that really illustrate climate change.

Q. Are there ways that the Arboretum's living collection can contribute to studies like yours?

A. One of the problems we have with using trees in climate change research is their slow growth and longevity. It's much harder to determine how thirty years of climate change is affecting a 70-year-old tree than a plant with an annual life cycle. But the Arboretum is the perfect environment to understand this, and work by Putnam Fellow Ailene Ettinger in my lab offers a great example. Ailene has been extracting core samples of Arboretum trees to analyze their annual growth rings, comparing this data against climate records to see if there is evidence of growth sensitivity. A big part of the potency of this work is that the Arboretum holds incredible provenance data, so we know where these trees came from, sometimes quite exactly. We know how far they've been moved geographically from their native habitat, so we can use that information to look at plants living outside the climate they are used to and see what happens to them in novel environments. Outside of botanical gardens and arboreta, there is almost nowhere else to do this research, but that is the fundamental question we ask with climate change—what happens when the climate changes dramatically? Here we have a situation where that experiment has been carried out for nearly 150 years.

Q. Can Arboretum members and visitors assist efforts to monitor climate change and its effects?

A. Absolutely, and the best way is through citizen science collection of phenology. While recording phenology in Europe has a long tradition, the US has lagged behind. However, the US National Phenology Network sponsors Nature's Notebook (www.usanpn.org/natures_notebook), an online registry that encourages and standardizes collection of phenology data. The program generates extremely high quality data, because the protocols are all designed to track exact species and to record data even when plants aren't doing anything observable in terms of phenology, which can actually be important information. More people getting involved to collect year-to-year data will be critical to gaining a better understanding of the dynamics, which aids our ability to make predictions. The Arboretum provides the perfect setting for this kind of engangement, because all the plants are labeled and mapped. We just need more eyes on them.

ADULT EDUCATION OPPORTUNITIES

The Arboretum offers a variety of learning opportunities for adults. Below is a partial list of our spring/summer classes and lectures followed by descriptions of featured programs. To view all programs by month, please visit our online registration system at **my.arboretum.harvard.edu**. For additional assistance, call Pamela Thompson at 617.384.5277 or email adulted@arnarb.harvard.edu.

Program Highlights

Full list of classes available at **my.arboretum.harvard.edu**

The Orchard Ecosystem

Michael Phillips, Farmer and Orchardist, Lost Nation Orchard at Heartsong Farm, Groveton, NH
Wed March 18, 12:30-3:30pm [WCSC]
Farmer and writer Michael Phillips, author of *The Holistic Orchard*, discusses his holistic approach to growing healthy and wholesome tree fruit and berries in this seminar. The primary role of fruit growers is to build system health. Embracing forest edge ecology is an important starting point for biological advantage for fruiting plants. Equally apropos are fascinating ecosystem connections that keep insect challenges far more manageable. Michael will examine dynamics like beneficial accumulators, pollinator habitat, spider allies, even how plant growth cycles suggest particular task timing to enhance these connections. Holistic methods are about deep nutrition and competitive colonization—which are enhanced by knowing stewardship of the orchard ecosystem.

Fee $45 member, $60 nonmember (lunch included)
Offered with the Friends of Wellesley College Botanic Gardens and the Ecological Landscaping Association

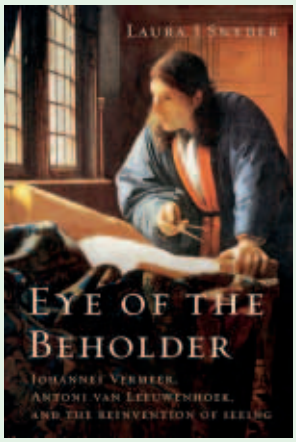
Planning and Creating a Compact Orchard

Staff, The Mary M. B. Wakefield Charitable Trust
Sat Mar 21, 9:00–11:00am [WE]
If you have the time and the space, nothing beats creating a backyard orchard to grow and harvest your own fruit! Even with a small yard, you can enjoy fruit from your own trees with minimal effort and cost. This step-by-step workshop will teach you all you need to know to plan and create a compact orchard for years of enjoyment. Participants will spend part of the workshop outside in the orchard at the Mary M. B. Wakefield Trust in Milton for a pruning demonstration, so dress accordingly. Space is limited; pre-registration required.

Fee $20
Offered with the Mary M. B. Wakefield Charitable Trust

Eye of the Beholder: Johannes Vermeer, Antoni van Leeuwenhoek, and the Reinvention of Seeing

Laura Snyder, PhD, Science Writer and Professor of Philosophy, St. John's University
Wed Apr 8, 7:00–8:30pm [HB]
"See for yourself!" was the clarion call of the 1600s. Scientists peered at nature through microscopes and telescopes, making the discoveries in astronomy, physics, chemistry, and anatomy that ignited the Scientific Revolution. Artists investigated nature with lenses, mirrors, and camera obscuras, creating extraordinarily detailed paintings of flowers and insects, and scenes filled with realistic effects of light, shadow, and color. By extending the reach of sight the new optical instruments prompted the realization that there is more than meets the eye. But they also raised questions about how we see and what it means to see. In answering these questions, scientists and artists in Delft changed how we perceive the world. Author of *The Philosophical Breakfast Club*, a Scientific American Notable Book, Laura Snyder returns to the Arboretum to share her latest book, *Eye of the Beholder*, in which she pairs painter with natural philosopher to explain the revelatory ways of seeing in the 17th century.



Fee $5 member, $10 nonmember

Growing Plants from Seeds

Jack Alexander, Plant Propagator, Arnold Arboretum

Sat Apr 11, 9:00am–1:00pm [DGH]

Jon Hetman

There's nothing more satisfying to a gardener than growing plants from seeds. From annuals and perennials to trees and shrubs, success can be achieved if you understand what triggers germination. Expert propagator Jack Alexander will share techniques for starting various types of plants from seeds. This workshop is for beginners and those who have been frustrated in past attempts to transform seed to seedling. Students will leave class with a selection of seeds raring to grow. Aftercare will be necessary.

Fee $50 member, $65 nonmember

Healthy Places in the Transition Century

Ann Forsyth, PhD, Professor of Urban Planning, Harvard Graduate School of Design

Tue Apr 28, 7:00–8:30pm [HB]

In the coming century urban populations around the world will grow at uneven rates—some places will lose population in metropolitan areas while others will grow. Populations in most places will be older on average. How can the growing body of research on the connections between health and environments be used to make a positive contribution to evolving urban and suburban communities? Ann Forsyth will speak about the components that contribute to healthier and more sustainable cities, alternatives to sprawl, and the tensions that exist between social and ecological values in urban design.

Fee free member, $10 nonmember

Nature Photography Workshop

Erik Gehring, Freelance Photographer

Sat May 2, 9:00am–12:30pm (Rain date: May 3) [HB]

Improve your photographs of nature in this half-day workshop—a talk followed by hands-on experience. The class takes place at the Arnold Arboretum at one of the most beautiful times of year. Learn about composition, color, light, depth of field and focus. Bring your camera and manual and familiarize yourself with the operation of your camera prior to the workshop. Level: beginner/advanced beginner.

Fee $60

Offered with the Eliot School of Fine & Applied Arts

Follow that Fragrance! Chasing Lilac History

Ben Miller, Fellow, Radcliffe Institute for Advanced Study, and Team Lilac

Sun May 3, 2:00–3:00pm [HB]

How are white lilacs and Rachmaninov connected? What villainous role did lilac blooms play on the old "Batman" TV show? Can you name the Walt Whitman lilac poem not addressing President Lincoln's assassination? This year at the Radcliffe Institute for Advanced Study, fellow Ben Miller and his Harvard College research partners have been harvesting material for a book-length lyric essay about the lilac aura, and ways it has filtered through their own lives and cultures around the globe. In this lively program on the cusp of Lilac Sunday (May 10), "Team Lilac" will present an array of poems, songs, monologues, and visual art celebrating the lavish, mysterious, and ever-enduring charisma of *Syringa vulgaris*.

Fee free, registration requested.

The 25 Most Common Trees in Boston

Kyle Port, Manager of Plant Records, Arnold Arboretum

Sun May 17, 9:00am–1:00pm [HB]

Kyle Port

In just a few hours you can learn to identify 90 percent of the trees growing in Boston, both native and nonnative. Beginning in the classroom, you will briefly review the characteristics of the 25 most common trees and learn the botanical terminology necessary to describe them. You will then walk the grounds of the Arboretum to look at mature specimens of these trees. Bring a notebook or clipboard for this information-rich program.

Fee $50 member, $65 nonmember

Chasing the Red Queen: The Evolutionary Race Between Agricultural Pests and Poisons

Andy Dyer, PhD, Associate Professor of Biology, University of South Carolina, Aiken

Wed Jun 10, 7:00-8:30pm [HB]

In *Through the Looking Glass*, the Red Queen tells Alice she must run as fast as she can just to stay in place. Modern agriculture, with its almost total dependence on chemical pesticides, is the Alice of today. Try as we might, our every attempt to control insects and weeds is met with an evolutionary response: they adapt and become resistant to the poisons. We fight back

with new, improved chemicals—they respond by adapting again, and on it goes, over and over, as it has for the past sixty years. But Andy Dyer believes that if we use the principles of evolutionary biology, we stand a good chance of taking control of our food supply and weaning our agricultural system from chemical dependence. Join us for a biological perspective on securing foods of our future.

Fee $5 member, $10 nonmember

Pruning Project: Taming the Early Season Bloomers

Jen Kettell, Horticulturist and Educator
Mon Jun 15, 6:30-8:30pm [HB]
Now is the time to prune those early-blooming shrubs—once they've flowered—so their growth through the summer can fuel the development of next year's buds. ISA-certified arborist Jen Kettell will focus your attention on the kinds of shrubs that should be pruned now, various pruning cuts, and the type of thinning that will encourage health and vibrant blooms for years to come.

Fee $25 member, $35 nonmember

In the Groves: A Summer Solstice Journey

Diane Edgecomb, Storyteller, and Margot Chamberlain, Celtic Harpist
2 Sessions: Fri Jun 19 or Sat Jun 20, 6:30–8:30pm [HB]
Join us for an enchanting evening of tree myths, songs, and summer solstice legends. Diane and Margot spin tales of the human connection with trees and the meaning we have assigned to them through the ages. Designed specifically for the Arnold Arboretum, this unique performance travels through the landscape with story and music. Each story is told under a different tree or among a unique collection of Arboretum plants. The program begins under a grand Cedar of Lebanon, moves into the rosaceous collection, to the oaks of Bussey Hill, and then onward to Hemlock Hill, culminating with the haunting Czech legend "The Wild Woman of the Birch Grove" told amid the birches at sunset. Appropriate for adults and for children twelve years and above. Registrants will walk approximately two miles on and off trails on uneven terrain. In the event of rain, the event will be held in the Hunnewell Building.

Fee $20; $25 after June 10

Introduction to Plant Families

Carol Govan, Artist and Naturalist
3 Sessions: Saturdays, July 18, 25, August 1, 10:00am–2:00pm [GITW]
In this class, we will use both microscopic and field investigation to decipher the clues to familial relationships and classifications of New England's wild plants. You'll learn basic formulas for plant structure and how to apply these to other families. Bring lunch and a hand lens.

Fee $178 member, $218 nonmember

Offered with the New England Wild Flower Society

Key to Course, Lecture, and Workshop Locations

BSG	Bussey Street Gate, Bussey Street, Boston, MA
DG	Dana Greenhouses, 1050 Centre, Boston, MA
GITW	Garden in the Woods, Framingham, MA
HB	Hunnewell Building, 125 Arborway, Boston, MA
WCSC	Wellesley College Science Center, Wellesley, MA
WE	Wakefield Estate, 1465 Brush Hill Road, Milton, MA

Save the Date for a Sesquicentennial Commemoration of Frederick Law Olmsted's Report on Yosemite and the Mariposa Grove


Mark J. Miller

Staff of Frederick Law Olmsted National Historic Site
Sun Aug 9 (Check website for event time and additional details)
Frederick Law Olmsted National Historic Site and the Arnold Arboretum are planning an outdoor commemoration of the 150th anniversary of Frederick Law Olmsted's report, Yosemite and the Mariposa Grove. In his 1865 report, Olmsted articulated—some say for the first time by anyone—the role of government in protecting and making accessible our nation's scenic landscapes for the enjoyment of all people in a democracy. Join us in the landscape by a giant sequoia (*Sequoiadendron giganteum*) as we read aloud portions of the report with Olmsted's eloquent and prescient prose on the actual anniversary of its first public reading.

Fee Free

Offered with the Frederick Law Olmsted National Historic Site

Visit and Explore the Arnold Arboretum

Jon Hetman

The Hunnewell Building near the Arborway Gate is open for restoom access and business guests:

April through October: weekdays, 9:00am to 5:00pm; weekends, 10:00am to 5:00pm

November through March: weekdays, 9:00am to 4:00pm; weekends, Noon to 4:00pm

The Visitor Center in the Hunnewell Building is open:

April through October, 10:00am to 5:00pm
November through March, Noon to 4:00pm
Closed Wednesdays and holidays

Services available in the Visitor Center include:

- Personal assistance to enrich your visit
- Membership information
- Maps and postcards
- Changing exhibits from the Arboretum archives
- Seasonal art exhibitions
- Activities for children and families
- Lost and found

Telephone: 617.384.5209

The Arnold Arboretum Horticultural Library is open to the public Monday through Friday, 10:00am to 3:45pm. For library information, visit our website, call 617.522.1086, or email hortlib@arnarb.harvard.edu.

Visitor Parking & Driving Permits

Visitor parking is available around the Arboretum's perimeter. No parking is allowed inside the Arboretum gates. Individuals with special needs may request a driving permit at the Hunnewell Visitor Center on Monday, Tuesday, Thursday, or Friday between noon and 3:00pm, except holidays. For more information please call 617.384.5209.

SPECIAL EVENTS

Collections Up Close

Celebrate amazing, ephemeral plant phenomena

Collections Up Close offer great ways to explore plants at the Arboretum. Drop-in for a guided tour, pick up a paintbrush, look under a microscope, and chat with knowledgeable staff and volunteers. Check our website for the full schedule of activities for each event in the series, and look for more in the fall. *Free.*

Lilac Sunday

Sunday, May 10, 10:00am–3:00pm

Of the thousands of flowering plants in the Arboretum, only one, the lilac (*Syringa* spp.), is singled out each year for a daylong celebration. With more than 380 lilac plants of 172 kinds, the Arboretum holds one of the premier lilac collections in North America. Tours of the lilacs and other special collections, family activities, picnicking (on this day only) and food vendors make for a memorable day. Be a part of this beloved Boston tradition!

Jon Hetman

Lindens in the Landscape

Sunday, June 21, 1:00–3:00pm

The *Tilia* (linden) collection is the largest genus of summer-flowering trees in the Arnold Arboretum—nearly 150 trees are in the collection, most along Meadow Road. In late June and early July they are at the height of their bloom, providing an exceptional opportunity for study, comparison, and enjoyment. Linden flowers attract pollinating bees and appreciative visitors with their wonderful, enticing fragrance. Join us on Meadow Road for a tour of the *Tilia* collection with our curatorial staff. There will also be family activities focusing on the lindens.

Art Exhibitions in the Visitor Center

The Invented Landscape

Paintings by Nancy Sableski

February 21–May 29, 2015

Reception: Saturday, February 21, 1:00–3:00pm

Just as the Arnold Arboretum is an invented landscape, so are the paintings in this exhibition. While every work of art is an invention, Nancy Sableski takes this concept a step further by painting imagined landscapes that are constructed by blending multiple images taken with her cellphone. In this way she invents places that don't exist but which clearly refer to the Arboretum. This technique allows her to examine aspects of landscape that continually capture her imagination: the interplay of powerful verticals, unpredictable diagonals, and receding horizontals.

Artists in the Arboretum

Jamaica Plain Open Studios

September 17–October 18, 2015

Reception: Thursday, September 17, 5:00–7:00pm
JPOS weekend: Saturday and Sunday, September 19 and 20, 10:00am–5:00pm

Local artists exhibit juried works inspired by the Arboretum in conjunction with the annual Jamaica Plain Open Studios, the premiere annual arts event in one of Boston's most vibrant and diverse neighborhoods. For more event information, visit jpopenstudios.com.

Arboretum Inspiration: Image and Word

An Exhibition of Photographs and Poetry by Philip McAlary and Holly Guran

June 5–September 3, 2015

Reception: Saturday, June 6, 1:00–3:00pm
Reading: Sunday, August 2, 1:00–3:00pm

"…Remember, whatever comes next, we have walked here."
Excerpt "On Peter's Hill" Guran, *River Tracks*, 2007

Together, poet Holly Guran and photographer Philip McAlary have witnessed the continuous inspiration of the Arboretum. Their nature-focused images and words complement each other, melding sight, sound, and mind. Frequent walks in the landscape were the influence and force behind this collaboration that unites McAlary's vibrant images with Guran's thoughtful words.

Holly Guran, author of the chapbooks River Tracks *(Poets Corner Press),* Mothers' Trails *(Noctiluca Press), and the forthcoming* River Full of Bones *(Iris Press), earned a Massachusetts Cultural Council finalist award in 2012. Philip L. McAlary studied at Otis Art Institute in Los Angeles. He participates in the Boston Camera Club and has exhibited in several galleries.*

Free Guided Tours & Explorations


Jon Hetman

This season we will be offering many free landscape tours. Tours are available each Saturday at 10:30am and Sunday at 1:00pm beginning April 18 and continuing through October. Weekday tours on Mondays and Thursdays at 10:30am will be available during April, May, June, September, and October. Please check our website for days, times, and additional details on each tour. All tours last approximately 90 minutes, are geared toward adults, and are free of charge unless otherwise noted. Our tours are for individuals, not organized groups. However, private group tours are available upon request. For more information or to register, visit my.arboretum.harvard.edu or call 617.384.5209.

Landscape Explorations for Adults: Theme Tour Highlights

Theme tours offer a look into a special focus or area of the Arnold Arboretum. Please check our online calendar for further descriptions of these tours and others. Meet at the Hunnewell Building unless otherwise specified. The tours below are geared toward adults, registration requested. *Free*.




All: William Friedman

Winter Trees–Celebrating Conifers
David Donovan, Arboretum Volunteer
Saturday, February 28, 12:30–2:00pm [Bussey Street Gate]

Winter Wellness Walk
Arboretum Docents
Sunday, March 8, 1:00–1:45pm

Spring into Health
Rhoda Kubrick, Arboretum Docent
Two Saturdays: March 14 and April 11, 10:30am–noon

Winter Trees—Beautiful Bark, Stunning Stems
David Donovan, Arboretum Volunteer
Saturday, Mar 28, 12:30–2:00pm

Calling All Birders!
Bob Mayer, Arboretum Docent
Three Saturdays: April 18 [Arborway Gate], May 2 [Peters Hill Gate], and May 30 [Arborway Gate], 8:00–9:30am

Birds of Bussey Brook Meadow
Bob Mayer, Arboretum Docent
Sunday, May 3, 8:00–9:30am [South Street Gate]
Co-sponsored by Aboretum Park Conservancy

From Seed to Tree
Staff of the Dana Greenhouses
First Tuesday of the month, May–October, 1:00-1:45pm [Bonsai House]

Behind the Scenes at the Dana Greenhouses and Larz Anderson Bonsai Collection
Tiffany Enzenbacher, Supervisor of Plant Production
Sunday, June 28, 10:00-11:30am [Bonsai House]

Explorations and Activities for Families

Family Walks
Sarah Atherton, Visitor Education Assistant
Family walks are offered one Saturday a month:
May 16, June 13, July 18, August 15, September 12, and October10, 11:00am-noon
Discover the Arboretum on guided walks especially for families. Each walk will highlight different plants and natural phenomena while developing observational skills in children. One adult can bring a maximum of three children; suitable for children ages four through twelve. Meet at the Visitor Center.

Explorer's Club
Be a part of our Explorer's Club! Borrow a Discovery Pack from the Visitor Center with tools and fun activities for hands-on exploration of our landscape and trees with kids. A perfect way to enhance the visits of families, homeschoolers, and after-school groups.


Jon Hetman

2015 Membership Events & Offerings

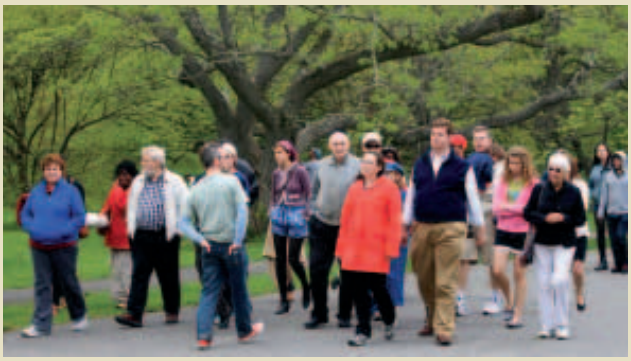
Members help the Arnold Arboretum flourish! We hope you will join us for one or more of the following membership events and benefit offerings. We are grateful for member support and are pleased to offer these opportunities to visit and engage with our staff experts for continued exploration, learning, and enjoyment. Detailed information and directions to membership events and other Arboretum activities may be found on our website as events are scheduled and posted. Join or upgrade today to take part in these special membership offerings.

Priority Registration for Members

In additon to discounted fees for most Arboretum educational opportunities, we are pleased to offer our members early registration for several of our lectures, classes, and special events, including the Director's Lecture Series. Login or create a profile on our online registration portal at my.arboretum.harvard.edu to register.

Members' Plant Dividend

Members at the Sustaining ($100) level and above may elect to receive our 45th annual Plant Dividend distribution to grow a selection from the Arboretum greenhouses. This year's plant is *Styrax japonicus*, the Japanese snowbell. This lovely and delicate flowering tree will make an attractive addition to most gardens. Qualifying members will receive a Plant Dividend letter in February with additional information and a plant request reply form.



Members' Tour Day

A rite of spring, Member's Tour Day is our annual gathering for staff-led tours of the living collection. Register to join us on **Saturday, April 25** to enjoy a morning of learning and fun, exploring the awakening spring landscape with our expert staff. Postcard invitations will be mailed to all current and new members in late winter, and additional event details will be posted on our website and online registration portal.

Members' Plant Giveaway

On **Saturday, September 19** from 10:00am to noon join us in the landscape for the Members' Plant Giveaway, a horticultural event open to current members at all levels. Attend to select one or more Arboretum-grown plants based on membership level, and learn more about cultivating trees, shrubs, and vines from our knowledgeable staff and volunteers. Event schedule, directions, and parking instructions are mailed to members prior to the event, along with a plant brochure, admission ticket, and coupon for free plant(s).

The ARNOLD ARBORETUM of HARVARD UNIVERSITY

125 Arborway
Boston, MA 02130-3500

visit us online at arboretum.harvard.edu

In our Collection

Stewartia pseudocamellia

Jordan Wood, Curatorial Fellow

Few genera encapsulate the Arnold Arboretum's capacity to investigate botanical and horticultural questions better than *Stewartia*. Along with the Franklin tree (*Franklinia alatamaha*), stewartias represent the deciduous and reliably hardy plants of the tea family, Theaceae. While Asian species of stewartia may reach heights of more than 40 feet in the wild, cultivated specimens typically grow as large shrubs or small trees, as do both North American species (*S. malacodendron* and *S. ovata*). Displaying white flowers in early- to mid-summer and often featuring striking bark hues and textures, the six hardy species in *Stewartia* provide remarkable year-round interest. Two Japanese stewartias (*S. pseudocamellia*) have proven to be the longest-lived and arguably the most horticulturally productive specimens of the genus at the Arboretum. Both plants (AA #11440A and *B) originate from a seed collection made in 1917 by plant explorer Ernest Henry Wilson at the densely-wooded base of Mt. Jirisan in South Korea.

Peter Del Tredici

Above, the species epithet of *S. pseudocamellia* refers to its camellia-like blooms which open in random succession over its flowering period in summer.

Growing adjacent to each other on Chinese Path atop Bussey Hill, these two individuals have reached heights of 32 and 27 feet respectively—remarkably comparable in size to those of the wild population in which they were discovered. Originally considered a separate species (*S. koreana*), they were affectionately described by Wilson in 1929 as possessing a more "cheery personality" than the Arboretum's Japanese collections of *S. pseudocamellia*. Indeed, over the years they have demonstrated the distinct hardier character as well as ornamental potential of the Korean provenance through a longer flowering period and greater persistence of individual blooms. Of particular note, *S. pseudocamellia* #11440*A crossed spontaneously with *S. ovata* var. *grandiflora* (mountain stewartia) at the Arboretum to produce the hybrid *Stewartia* 'Scarlet Sentinel', a cultivar distinguished for the vibrant cherry-red color of its flowers' anther filaments (read more about its discovery and introduction in *Arnoldia* 62/3).

In addition to its ornamental significance, the *Stewartia* collection holds immense botanical potential as one of six "national collections" of genera at the Arboretum through a partnership with the North American Plant Collections Consortium. With a long history of plant exploration and multiple accessions of the hardy members of the genus represented in its landscape, the Arnold Arboretum is perhaps the best place in North America to observe and learn about these beautiful and fascinating trees.