From the Director

This issue of *Silva* is very plant focused, with articles addressing a major project involving the digitization of the seed herbarium at the Dana Greenhouse; a recent plant-collecting expedition to Luoji Shan in China; and research projects using the Arboretum’s collection of conifers. Only the history of the Landscape Institute appears to have escaped this plant-centric perspective, but not for long.

In considering the 2002 administrative transfer of the Radcliffe Seminars in Landscape Design and Landscape Design History to the Arnold Arboretum, I felt that there were a number of special resources that the Arboretum might contribute to enhance and advance a program already operating at an outstanding level of quality: our long history and devotion to the research and rigor brought to the execution of any project, as well as our commitment to a scientific understanding of landscape and the way this understanding informs the creation of sustainable designs. Above all, though, it is our dedication to horticultural excellence, and therefore our belief that plants and their health lie at the heart of all excellent designs, which will be of utmost benefit to the program. This horticultural commitment is evident in our exceptional library holdings and in the expertise of our staff. All of these characteristics will contribute to the now renamed Landscape Institute and will serve to broaden the future impact this entity will have on gardens and green spaces, both great and small.

This past spring the Arboretum made a significant financial commitment to the Landscape Institute in endeavoring to relocate the program to a new and appropriate home. Harvard University has leased to the Arboretum some raw space in one of its buildings near Cambridge’s Harvard Square. As I write, we are in the process of fitting out new classrooms and offices at 29 Garden Street, a building with several large planting beds currently growing some rather lackluster ground covers. I suspect that this landscape will soon see a transformation, and that plants will likely be at the heart of it.

—Robert E. Cook, Director of the Arnold Arboretum
The Horticultural Library of the Arnold Arboretum, housed on the third floor of the Hunnewell Building, has grown from the 6,000 tomes acquired from founding director Charles Sprague Sargent to a collection of more than 40,000 volumes. The library, and its rich holdings on all aspects of plant life, serves the general public while supporting Arboretum research, curation, and education.

With the formation of the Landscape Institute in 2002, library staff developed additional resources and programs to meet the needs of landscape design students. Of special interest and value to students are the scores of independent projects produced since 1980 by previous graduates of the Institute. Housed in the library’s reference section, the works offer real-world case studies within the Institute’s disciplines, including garden design, historic landscape preservation, land use and environmental policy, and critical surveys of historic landscapes and landscape designers. The library staff has increased the holdings in landscape architecture and design and developed a reserve section of required and recommended materials for classes to further address the specific reference needs of the Institute’s faculty and students.

Join a library information session on September 16 or January 27 at 10:00 am or visit the library online at arboretum.harvard.edu/library/library.html. You may call our librarians at 617.522.1086.
Have you ever been lost or confused trying to find your way around the Arboretum? If so, we hope those days will soon be over. With the help of signage consultant Roll, Barresi & Associates, an environmental graphics design firm, the Arnold Arboretum is creating a comprehensive system of directional signs. Sylvia Winter, landscape project manager, is working closely with Roll, Barresi & Associates to create a system that will help visitors better appreciate and interact with the collections.

We have four basic goals: make it easier for visitors to find the Arboretum; provide a sense of institutional identity and welcome upon arrival; more effectively direct visitors to locations throughout the collections; and mark arrival points so that visitors know when they’ve found their destination (which may include paths, collections, scenic vistas, gates, and the Visitor Center).

While these goals may seem simple, their implementation is complex. To be successful, signage materials and siting of signs must be carefully considered. Elements should be consistent and harmonious with the aesthetic and historic character of the Arboretum, relate to Emerald Necklace signage while still communicating our individual identity, and be visible in the landscape without distracting from the design and collections.

We will have achieved our goals if visitors can determine where they are, where they are going, and when they have arrived. To ensure success, we will engage visitors in a pilot test this fall. Look for temporary mock-ups of maps and signs as we assess these new elements. Julie Warsowe, manager of visitor education, will be on the grounds in September and October interviewing Arboretum visitors. She will use visitor feedback to check that signs and maps are effective and to improve their clarity, legibility, and functionality before we invest in permanent versions. The new system will be finalized and fabricated over the winter and installed later in 2007. We look forward to improving your Arboretum experience!

Get Lost? Not Anymore!

Corliss Knapp Engle remarks on her experience as an Arboretum volunteer at the May 11 opening of an exhibition of her photographs, The Arnold Arboretum Captured in Time: 1982-1987. The exhibition featured sixteen images of the Arboretum landscape in all seasons, culled from color slides she took as part of a project to create an introductory slideshow for the Visitor Center. In addition to volunteer work in the slide library, Corliss is a charter member of the Director’s Advisory Committee and served a term on the Committee to Visit the Arnold Arboretum.
Azalea Path

Many new and restituted plantings, particularly of the beautiful pinkshell azalea (*Rhododendron veseyi*), were added to Azalea Path last spring as part of an effort to revitalize this serene destination on the western edge of Bussey Hill. Originally planted at the turn of the 20th century to relieve overcrowding in the Arboretum’s former shrub collection, Azalea Path was restored through a generous contribution by Sheila G. Cook.

Here, Hunnewell intern Siobhan Sullivan and horticultural technologist Scott Grimshaw apply a finishing layer of mulch in one of the replanted beds.

Visiting Committee

The Committee to Visit the Arnold Arboretum, which reports on the Arboretum’s activities to Harvard’s Board of Overseers, met last spring to discuss and evaluate the progress of the plans for new facilities and to assess the expanded research programs and ambitions of the institution. The Committee learned about the Arboretum’s plant collecting and botanical research in the Hengduan Mountain region of China from David Boufford and Susan Kelley, and viewed a demonstration of the Arboretum’s new web pages that feature the recently digitized collection of Asian images presented by archivist Sheila Connor.

Pausing beneath the Arboretum’s oldest and largest paperbark maple (*Acer griseum*) during a tour of Chinese Path are *left to right* Steve DiFazio, Rick Burnes, David Ackerly, Scott Miller, Quentin Cronk (chair), Kathleen Pryer, Jack Wittenburg, Mary Topa, and Chris McKown with Arboretum director Bob Cook. Not pictured are Nina Archabal, David Baum, and Kim Tripp.
The Arnold Arboretum has long been sending explorers to remote and biologically rich areas overseas in search of exceptional plant material. One use of this material has been to expand the scope and relevance of its living collections, an important part of the Arboretum’s mission throughout its history. Plant propagation plays a major role in the success of this effort, but propagation can be extremely challenging when the material at hand is little known to science or horticulture. Seed-based propagation remains the primary method for building our diverse collections, but the task of identifying seeds has often depended on the intuition of the propagator.

About forty years ago then-propagator Alfred Fordham, finding no published information to help him identify seeds, created the seed herbarium to support his extensive experimentation on seed germination protocols and seed viability. The seed herbarium has subsequently become a valuable asset to Arboretum staff, and currently holds 1,350 samples, 915 of them from plants in the living collection. These specimens are often used to help distinguish seeds from the chaff that accumulates during the process of cleaning and to differentiate among seeds of closely related species. Both of these tasks will now be made easier by an ambitious new effort at the Dana Greenhouses to create high-quality digital images of material in our seed herbarium. These images will improve the accessibility of this rare and important resource and will assist in the documentation of the Arboretum’s collections. The work now being done, supported in part by the J. Frank Schmidt Family Charitable Foundation, represents the first stage of a three-year project to document the current seed herbarium and create systems that will incorporate new material. Over the last two years, staff and volunteers have reorganized the collection, created an inventory, and collected additional seed material from plants growing at the Arboretum. Since spring, following the purchase of specialized equipment and the outfitting of a work station at the Greenhouses, the staff has taken multiple images of each of the seed samples presently in the herbarium. Corresponding seedlings, when available, are also photographed to help identify plants at a young age. The images, along with other data about the seeds, will be added to the Arboretum’s plant records database. Its capacity to integrate images and other information about seeds and seedlings, mature accessions, and herbarium specimens will provide a more detailed description of individual plants on the grounds, a resource easily shared online with international botanical and horticultural communities.

Collecting expeditions, botanical institutions, and nurseries provide the Arboretum with about 200 seed accessions each year, which in turn are grown as possible new accessions for the living collections. Now the digital imaging of these seeds and seedlings adds a significant dimension both to their propagation and to the Arboretum’s plant records. Next steps include expanding the seed herbarium itself by incorporating seeds from rare and endangered Arboretum accessions and by adding seed images and related data to our robust profiles of Acer (maple), Carya (hickory), Fagus (beech), Syringa (lilac), and Tsuga (hemlock).
The flora of China has been a focus of research for the Arboretum since the days of E. H. Wilson. The discoveries he and other plant explorers made have added greatly to our history, scholarship, and collections. Contemporary exploration relies heavily on collaboration with the Chinese at all levels, including government officials, botanical institutions, and local researchers. Last August, while building relations with counterparts in China, taxonomist Jianhua Li and senior research scientist Peter Del Tredici continued Wilson’s tradition of exploration and collection by traveling to Luoji Shan, an isolated mountain range in the southwestern Sichuan Province, near the border of Yunnan Province, to conduct a botanical inventory. The collecting team included a landscape ecologist from Sichuan University, Professor Tang Ya, four of his graduate students, and a bumblebee specialist from the British Museum, Dr. Paul Williams.

Luoji Shan was botanically under explored, though said to possess a great diversity of temperate plants. The trip proved the latter true: Luoji Shan harbors a rich deciduous forest that includes species of Sorbus, Betula, Abies, and Tsuga, more than thirty species of Rhododendron, and eight species of Acer, some of which are evergreen.

With the mountain undergoing rapid development as a location for ecotourism, however—two new hotels were about to open and a mile-long cable car, designed to move visitors up the mountain, had been installed—the need for inventory was urgent: native vegetation desperately needed to be documented before it incurred further damage. The team trekked on foot from eight to 13,000 feet above sea level to study the plants which had been flourishing on the mountain since it had been logged and burned in the 1950s. In all, the group collected herbarium specimens from about 400 species of plants, which will be divided among the collections of the Arnold Arboretum, Sichuan University, and the government of China. Jianhua also collected leaf samples from many plants, especially maples, for DNA analysis, and the graduate students collected data for their individual research projects on ecological conditions such as soil fertility, erosion, and the spread of invasive species. Although seeds from a few species were collected, it was somewhat too early in the season to harvest fruiting plants.

After two weeks of plant collecting on Luoji Shan, Peter spent a third week in China as the guest of the director of the Beijing Botanical Garden, Dr. Zhang Zuoshuang. There he lectured on invasive plant species and the role of disturbance in shaping the present and future landscape, and he explored the garden’s extensive displays in the company of Dr. Hu Dongyan, a specialist in flowering peach. The Garden has an impressive glass house measuring over 60,000 square feet and contains a large collection of penjing (bonsai) and herbaceous and tree peonies.
Conifer Studies Consider Global Differences

Thanks to more than a century of plant exploration, the collections of the Arnold Arboretum offer an exceptional resource for the study of woody plants from across the North Temperate Zone. In our 265-acre landscape, North American trees grow with their European and Asian relatives, allowing researchers valuable opportunities to study species of far-flung distribution side by side.

A recent study of the resistance of Chinese hemlock (*Tsuga chinensis*) to the hemlock woolly adelgid (*Adelges tsugae*) is one example of the scientific value of a globally diverse collection. The adelgid, a tiny insect that feeds with lethal effect on several species of hemlock, was introduced to eastern North America from Japan in the early 1950s. By the 1980s, native eastern hemlock (*Tsuga canadensis*) populations were beginning to suffer devastation throughout the mid-Atlantic, and by the 1990s the adelgid was well established in southern New England. When the insect was first detected at the Arnold Arboretum in 1997, senior research scientist Peter Del Tredici saw an opportunity to utilize the Arboretum’s nationally recognized hemlock collection to assess both Asian and North American species for resistance to the adelgid. The Arboretum’s long association with the Chinese hemlock, which began in 1901 when E.H. Wilson introduced the plant into cultivation from Hubei Province, made the species a logical candidate for study.

In 2003, Peter and Arboretum apprentice Alice Kitajima began to assess the adelgid resistance of both the Chinese hemlock and our native species. A population of thirty-eight Chinese hemlocks had been planted on Hemlock Hill in 1999. The resistance of these plants was compared with that of thirty-three seedlings of the eastern hemlock that were growing spontaneously, also on Hemlock Hill. The study found that the Chinese hemlock offers near complete resistance to the hemlock woolly adelgid, and that this species may serve as an important horticultural substitute for the highly susceptible eastern hemlock, which has long been a mainstay in cultivated landscapes.

Last fall the Arboretum’s extensive collection of conifers also played a role in a comparative study of Southern and Northern Hemisphere species. Tim Brodribb, a visiting researcher at Harvard from the University of Tasmania, examined Arboretum conifers as part of a larger study investigating evolutionary trends in leaf structure and function. Tim created a physiological profile of leaves specific to different conifer families in order to compare the tolerances of species from the Northern and Southern Hemispheres to cold, shade, and drought. The Arboretum’s conifer collection enabled Tim to study at first-hand the leaf structure and morphology of north temperate conifers in relation to...
species that he had previously investigated in the forests of Chile, New Caledonia, and New Zealand.

His findings suggest that the size of conifer leaves and photosynthetic productivity are closely linked. The water required for photosynthesis is supplied in most conifer leaves by a single vein. Because the movement of water from the vein into the blade is highly inefficient, the wider the leaf is, the lower its photosynthetic rate. Among Southern Hemisphere conifers, particularly members of the Podocarpus family, species have overcome the single-vein limitation by producing additional conduits that can supply water to a larger leaf area. While this adaptation enables Podocarps to produce larger leaves that help them compete more successfully against other species, it also probably increases their vulnerability to drought and frost.

While other plant groups also exhibit significant variation between taxa from opposite sides of the equator, conifers lend themselves especially well to comparative study owing to the manageable size of the group, a good fossil record, and a remarkable lack of significant anatomical change over their evolution. Tim’s experiments with conifers will be integrated with a larger study—including mosses, lycopods, and ferns—for publication later this year.

In providing a basis for the comparative investigations of species from across the globe, the living collections of the Arnold Arboretum promise increasing value as a resource for advancing our understanding of the evolution and adaptations of related but geographically disparate plants.

Rose Garden Maintenance

Kit Ganshaw center, a horticultural technologist who oversees the Eleanor Cabot Bradley Collection of Rosaceous Plants, is assisted by horticultural interns Charlotte Enfield right and Kelly Ruth as part of a concentrated effort to restore order to several overgrown planting beds. In addition to regular maintenance duties, plants were thinned to better delineate individual accessions.

Landscape Maintenance in Spanish

Last spring the Arboretum offered its first class taught entirely in Spanish. Landscape Maintenance in Spanish was developed in response to the growing number of Spanish-speaking professionals in the landscape trade. The fully subscribed workshop detailed horticultural methods surrounding soil fertility, plant growth and health, planting and pruning techniques, plant evaluation, and equipment safety. The class will be repeated periodically, and additional offerings taught in Spanish or Portuguese may be developed.

See page 24 for this semester’s Mantenimiento del Cesped y Paisaje (Landscape Maintenance in Spanish)
One of the most striking trees in the Arboretum in winter is *Acer griseum*, the paperbark maple. Its orange- to cinnamon-colored exfoliating bark is beautiful in the snowy landscape. *Acer griseum* was collected in central China by Ernest H. Wilson and introduced to Western cultivation by his employers, the Veitch Nurseries of England and the Arnold Arboretum. One grand specimen growing on Chinese Path, sent from China by Wilson in 1907, may be the oldest and perhaps the most magnificent paperbark maple in the Western Hemisphere. Another example, in the maple collection near the northern edge of the Eleanor Cabot Bradley Garden of Rosaceous Plants, shares the grand specimen’s lineage. Eight additional plants, representing six accessions, grow in other areas of the Arboretum.

The herbarium in the Hunnewell Building houses thirty-three preserved specimens of *Acer griseum*. Thirteen of these are gathered from the trees collected by Wilson: two are of foliage alone, four have flowers, six include fruit, and one is a winter twig. The specimen shown here is a flowering branch collected by taxonomist Alfred Rehder from Chinese Path on June 6, 1925. These carefully dried, mounted, and labeled specimens document the morphological traits of the plants from which they were taken and provide a record of the flowering dates that occurred in the year of collection. The linkage of plants on the grounds with specimens in the herbarium, together with decades of information in the plant records data base, comprise an exceptional resource for woody plant study and research.
The Landscape Institute had its beginning in 1966 when landscape architect Diane Kostial McGuire, then a Radcliffe College Bunting Fellow, was invited to teach a course in the Radcliffe Seminars. Her seminar, “An Intellectual History of Garden Art,” was so well received that by 1968 a landscape design certificate program had been formed around it. The program sought “to meet the needs of a wide range of students: those who wish to develop an awareness of the landscape or to investigate landscape design as a career; those who want to prepare for graduate school in landscape architecture; and those who wish to refine their skills for work with conservation groups, historic preservation commissions, and planning boards.” Four areas of study made up the core of the program: history, design, landscape construction, and plant materials—the basics of a landscape design education.

In 1970 the program, known as the Radcliffe Seminars in Landscape Design, held its first graduation ceremony, with six of its original two dozen students earning certificates. The curriculum soon expanded under the leadership of fellow Bunting Institute alumna Beatrice Petit-Barron to include site engineering, drafting, natural systems, and other technical training that prepared graduates to make not only gardens but significant contributions to local planning boards, conservation agencies, and other areas of community need. Over time a number of alumni launched highly visible and successful careers, earning the Seminars a distinguished reputation for innovation and leadership in landscape design education.

In 1999 Radcliffe College merged with Harvard University to become the Radcliffe Institute for Advanced Study. With its mission shifted to postgraduate research, the Radcliffe Institute sought a new home for its instructional offerings, inviting the Arnold Arboretum to accept administrative responsibility for its program in landscape design. Known today as the Landscape Institute, the program is now integral to the Arboretum’s education mission.

Under the leadership of John Furlong, director for twenty-five years, the Institute is growing in some important new directions. One is geographic—a required move from Cronkhite Hall has led to new quarters at nearby 29 Garden Street.

A more important transition concerns the training of landscape designers, and recognition of changes occurring within the profession that require a curriculum as dynamic as the medium itself. The growing call for sustainable landscapes and a design ethic that considers longer-term environmental impacts have become increasingly important priorities for both the Landscape Institute and the Arnold Arboretum. New offerings in plant science, ecology, land-use history, and related subjects will draw on the Arboretum’s scientific expertise to better prepare students for the greener future so necessary for our world’s welfare.

Other plans focus on strengthening the larger profession through presentation of courses, projects, and information that communicate the special aims and capabilities of the landscape designer. This important role for the Institute will find particular voice through exploration of historic landscape preservation, ecological restoration, and other growing specialties that call upon the combined knowledge of plants, people, and design that distinguishes many of the program’s graduates.

The current strengths of the Landscape Institute bode well for its success in accepting these and other challenges. Presently sixty percent of the faculty has more than ten years of teaching experience in the program, and a strong vision for how instruction can be further enhanced. Student enrollment has been at 300-plus for the last six years, spread over a curriculum that currently offers sixty-eight courses taught by thirty-two instructors. The program has been recognized by public and private institutions, and its students, graduates, and faculty have received numerous awards for projects and professional work.

With these ample strengths, the Landscape Institute will complement the Arboretum’s commitment to generating new knowledge in plant biology with programs that further our understanding of the role of plants in the human environment.
"Doc" Wallace

Dr. James W. Wallace, a longtime friend of the Arnold Arboretum and a charter member of its James Arnold Society for planned giving, calls himself a congenital naturalist. Raised in the Pill Hill section of Brookline, he spent many days as a child exploring the grounds and collections of the Arnold Arboretum. Here he could indulge what became a lifelong passion for the life sciences, which would guide him as a Harvard student at the College, Medical School, and Graduate School of Arts and Sciences.

His experience at Harvard University, which included tenures on the faculty of Harvard College and Harvard Medical School, broadened his scientific interests to include such disciplines as ichthyology and ornithology. His affection for the Arboretum, though, reveals his predilection for dendrology. “As I get older,” he declares, “I devote more of my natural history studies to trees, because I find them easier to catch than birds or fish. They can be examined up close, and you can return to the same living organism again and again.”

Dr. Wallace made a home in Cambridge after obtaining his Harvard degrees. He made frequent trips to the Arboretum to share his interest in trees with his late wife Linda and two sons. And many of the trees and shrubs in his Coolidge Hill garden came from Arboretum plant sales and distributions. His challenge, he points out, is his desire to grow everything he sees at the Arboretum in a limited amount of space.

The dual nature of the Arboretum, as both a public park and a private entity for plant collection and research, makes it particularly attractive to him as a beneficiary of his philanthropy. “I like the public/private partnership inherent in the Arboretum—it’s not a treasure for the privileged. It’s available to people who don’t know an oak from a daffodil, but enjoy the Arboretum as a place to visit and experience.”

Over the years, his philosophy of giving has evolved, becoming less focused on giving modest amounts of money to many places. “Unlike some situations,” he opines, “all your eggs in one basket in charitable giving can be appropriate. I’ve always had distaste for giving to general funds; I prefer building a personal relationship with the people who make the decisions for an institution.” Dr. Wallace’s gifts to the Arboretum are to be used at the director’s discretion, because he believes that every organization director needs access to funds that can advance new ideas and projects that might go beyond annual operating budgets.

With this in mind, Dr. Wallace established the Linda C. Wallace Fund at the Arboretum in 2001 in memory of his late wife. He contributes to the fund annually, and has pledged to donate his IRA to the fund. “The advantage, of course, is that money has never been taxed, and never will be,” he notes. Beyond this, he finds the Arboretum attractive as a beneficiary because of its future potential. “I can’t think of an organization that’s more likely to succeed in the long run than the Arnold Arboretum.”

Donating your IRA to the Arnold Arboretum can be an extremely easy and tax-wise move. If left to heirs, IRAs may be taxed significantly, at times up to seventy-five percent. Leaving your retirement plan to the Arboretum, however, ensures that one hundred percent of the plan’s value is preserved for generations to come. In order to make the Arboretum the beneficiary of your IRA, request a “Change of Beneficiary” form from your plan’s administrator and change the beneficiary to "President and Fellows of Harvard College, a Massachusetts educational, charitable corporation, for the benefit of the Arnold Arboretum."

If you have already designated the Arboretum as the beneficiary of your retirement plan, please let us know so we can ensure your wishes will be carried out. If you would like more information about leaving your retirement plan to the Arboretum, confidential inquiries may be directed to Robert P. Surabian at the Arnold Arboretum (617.524.1718 x 140 or robert_surabian@harvard.edu), or to Andrew Herr in University Planned Giving (800.446.1277 or andrew_herr@harvard.edu).
Special Events

Winter into Spring
Photographs by Carl Heide
Hunnewell Building Lecture Hall
Arnold Arboretum
February 5–March 30, 2007

Photography has been a passion of Carl Heide for twenty years. He turned his focus to plants, particularly woody plants, soon after completing a master’s degree in landscape design at the Conway School of Landscape Design in Conway, Massachusetts.

Interested in capturing all aspects of a plant’s beauty, from the intimate details to the functions it plays in the landscape, Carl has been a frequent visitor to the Arnold Arboretum and other natural areas around Boston in order to capture seasonal variations occurring across time. Carl lives in Beverly, Massachusetts.

Season and Mood:
Landscape Paintings and Photographs by Mark Richards
Hunnewell Building Lecture Hall
Arnold Arboretum
October 15, 2006–January 5, 2007
Reception with the artist
Sunday, October 22, 1:00–3:00pm

Mark Richards has been documenting the Arnold Arboretum with photographs and oil paints for many years. For Mark, one of the great similarities of "plein air" painting and photography is the immediacy of intent. Each aims to capture the spirit of time and place, season, mood, and atmosphere. Switching between media, he finds photography often inspires him to paint and painting helps him focus his ideas for photographs.

Mark Richards is an award-winning landscape and portrait photographer who lends his talents to oil painting. He teaches at the New Art Center in Newtonville and the Charles River School in Dover. Mark lives in Needham, Massachusetts.

Note: The lecture hall is often used for meetings and classes. Please call 617.524.1718 x100 for exhibition availability.