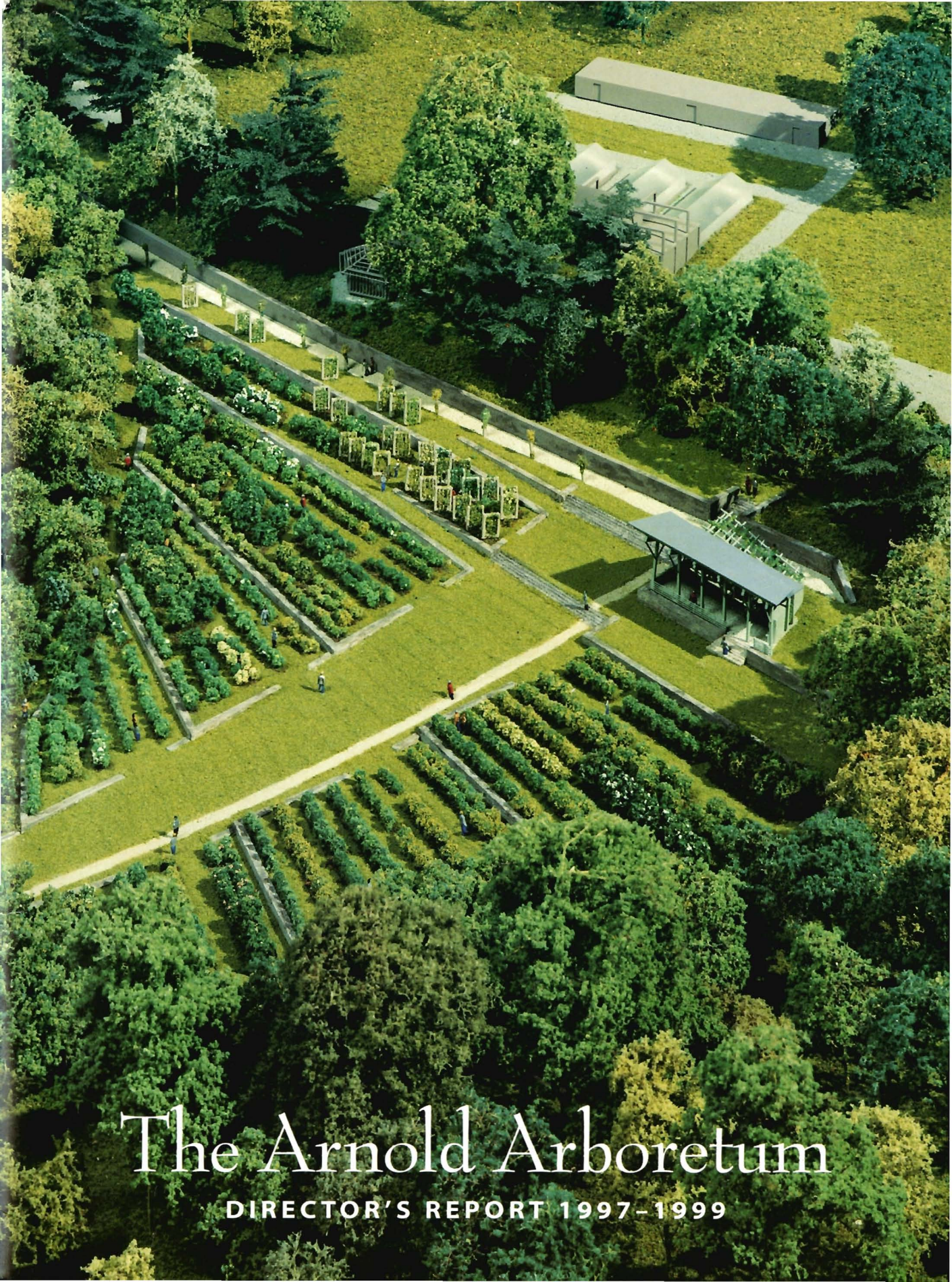

The Arnold Arboretum

DIRECTOR'S REPORT 1997–1999

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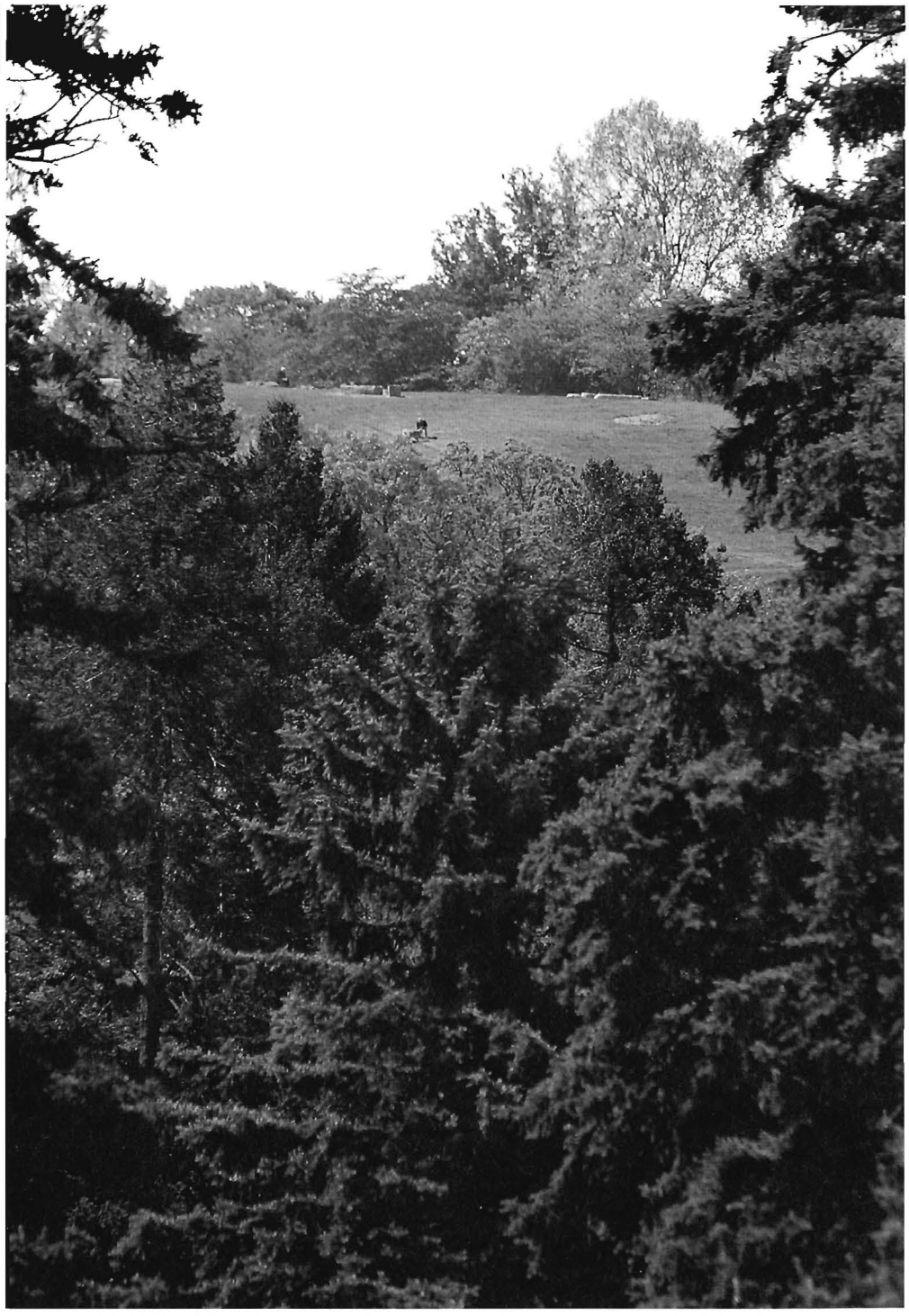
Robert E. Cook, Director

The Arnold Arboretum of Harvard University
125 Arborway, Jamaica Plain, Massachusetts 02130

Karen Madsen



The newly restored summit of Peters Hill seen from Conifer Path.

As we enter the new millenium, the Arnold Arboretum can celebrate a very significant accomplishment. For the first time since 1927, it has successfully concluded a broad-based fundraising campaign among its friends. In the process, it has established the Arboretum's first development department, dedicated to increasing the resources available to support its mission of research and education.

Like the other schools and affiliated institutions of Harvard, the Arboretum must survive within its own means. This philosophy of fiscal self-sufficiency is known around the University as "every tub on its own bottom." Our programs must operate within, and are therefore constrained by, our sources of income; these sources are largely past and present philanthropy as well as support for research, most of which comes from federal agency grants. Although we entered this past decade with a healthy endowment, created by a few generous bequests earlier this century, we must conduct successful fundraising campaigns periodically to preserve that endowment and to fund capital improvements to our facilities and landscapes.

Our goal for the campaign was $8,250,000. When it ended in December 1999, we had raised over $8,350,000 in outright gifts and pledges. The three largest gifts, each of $1,000,000, will create restricted endowments to support research and education programs. The success of our campaign also demonstrated our ability to raise funds in cooperation with other departments at Harvard as part of the larger University campaign. Equally important, we acquired many new friends who will continue to support our mission well into the next century.

In order to provide a clear picture of collections and finances, the director's report before you cites statistics for the past two fiscal years (July 1, 1997, to June 30, 1999). The description of our activities that accompanies these numbers will show that our financial success over the past decade is supporting increased attention to our Jamaica Plain collections and landscape, consistent with their place of priority in our mission. Over the next five years, we will invest approximately $5,000,000 to develop new collections, restore landscapes, and improve our grounds. All of these projects will enhance the value of the Arboretum to our community while fulfilling our dual mission of research and education on woody plants.

LIVING COLLECTIONS

Between July 1, 1997, and June 30, 1999, 266 accessions totaling 1,196 woody plants were added to the permanent collections; of these, 31 were taxa new to the Arboretum. At the end of June, the collections included 15,186 plants belonging to 4,463 taxa: 1,935 species, 534 infraspecific taxa, 1,709 cultivars, and 285 hybrids. Not included in the above accounting are 2,037 mature hemlock trees growing on Hemlock Hill that were added to our database as of June 30 to permit separate tracking of the hemlock woolly adelgid and its anticipated devastation of our hemlock forest. Despite the large number of accessions, the number of woody plants in the permanent collection declined by 448 individuals, reflecting the loss of more than 1,644 plants in two years. Approximately one-fifth of these can be attributed to the April Fool's Day storm of 1997; the remaining losses were due to old age, disease, and two major droughts.

For the past eight years, Peter Del Tredici has been director of living collections. His tenure in this position has been characterized by several significant trends. The department is working to integrate the sciences of botany and horticulture into a more unified whole that can better support our commitment to the highest standards of curation for research collections. This effort involved a large investment in software development for managing the collections electronically; a reduction in the quantity of annual accessions in favor of improved curation and cultivation; and a more ecologically sound approach to soil management, plant care, and pest control. Our commitment to quality is also reflected in higher standards for staff recruitment and increased educational opportunities for staff members. All these efforts must be carried out while maintaining complex working relationships with the City of Boston and the Harvard University Herbaria. The result is improved service for all our constituents: the public that experiences the landscapes directly; the commercial nurseries that propagate and disseminate horticultural material derived from our collections; and the researchers who use the collections to investigate scientific questions and train students.

In 1999 Peter received the Arthur Hoyt Scott Medal presented by the Scott Arboretum of Swarthmore College for "outstanding national contributions to the science and art of gardening." In the same year he was awarded a Bullard Fellowship for a half-year sabbatical of study at the Harvard Forest, where he completed research and writing on the biology of trees.

People

In September of 1997, Julie Coop was promoted to superintendent of grounds following the resignation of Patrick Willoughby, who moved across town to become landscape manager at Wellesley College. Julie in turn hired Tom Akin from Weston Nurseries to replace her as assistant superintendent. Tom will help supervise the grounds crew and will also manage the horticultural intern program.

Laura Tenny Brogna, a recent graduate of Harvard's Graduate School of Design, first came to know the Arboretum as an intern in 1995. Now, after a year here as a Putnam Fellow, she has been appointed landscape project manager, a new position created to provide additional management for several projects the Arboretum will undertake in the coming years (see below).

Karen Madsen

Bruce Munch waters in a newly planted *Magnolia stellata* 'Centennial'.

In February 1998, Stephen Spongberg retired from his position as horticultural taxonomist of the Arnold Arboretum after twenty-seven years of research, writing, and collection management. After a year-long search, the Arboretum appointed Jianhua Li to replace him. Jianhua grew up in China, where he received a traditional botanical education emphasizing anatomy, morphology, embryology, and physiology. He came to this country in 1993 and in 1997 received his Ph.D. in molecular plant systematics from the University of New Hampshire. Jianhua is an expert in Hamamelidaceae (witch hazel family) and Caprifoliaceae (honeysuckle family). Jianhua will use our collections for his research and publications, and he will also facilitate continuing collaborations with Chinese scientists and botanical institutions.

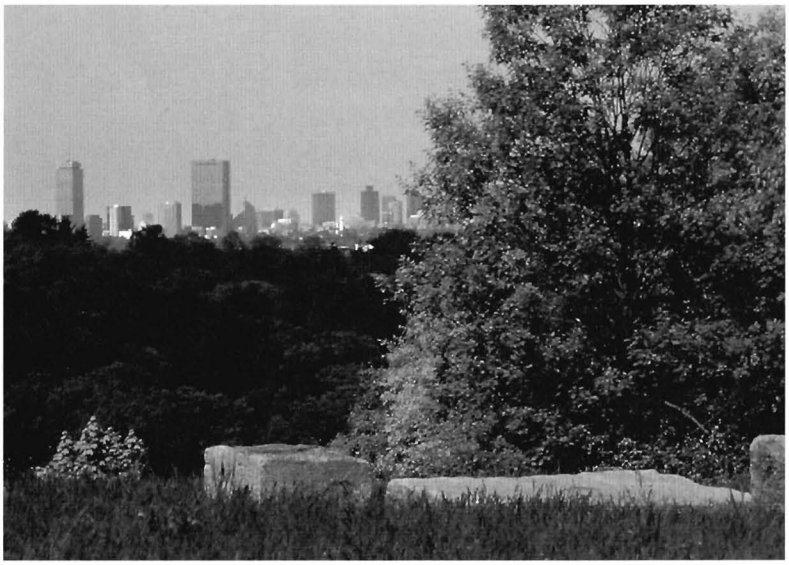
Threats

As noted earlier, the living collections experienced a number of assaults in the last two years that have taken their toll. The spring ice storm on April Fool's Day of 1997 destroyed a large number of mature specimens;

the severe droughts in the summers of 1997 and 1999 will continue to adversely affect the collections for several years. Our elm collection, for example, has long been suffering from Dutch elm disease, and drought-induced stress greatly exacerbates the problems caused by disease.

The newest threat to our landscape is an onslaught of hemlock woolly adelgids, leaf-sucking insects that attack hemlock trees. This invasive species, originating in Asia, was first seen in the Arboretum on hemlock crowns brought down by the April storm. While individual trees can be protected by spraying with horticultural oil or by systemic insecticides, these methods cannot protect entire tracts of land such as the 22-acre forest on Hemlock Hill. Experiments with biological controls—chiefly with other Asian insects that feed on the woolly adelgid—are underway in a few areas of New England but the results are not conclusive. Meanwhile, thousands of acres of hemlock forest in Connecticut and eastern New York have been totally devastated. Over the coming decade, the Arboretum will attempt to save about 200 specimen trees through twice-annual spraying and soil injections. Still, it is entirely possible that the landscape of our ancient hemlock forest will be completely transformed by this insect in the years to come.

Karen Madsen



Sitting stones face the Boston skyline on the summit of Peters Hill.

These environmental and biological depredations remind me of Charles Sprague Sargent's original mission for these collections: to grow all the woody plants hardy in the area of Boston. Ultimately, our great landscape of trees is a collection of survivors.

Projects

The last director's report in 1997 described the restoration of the summit of Peters Hill. In the spring of 1998 we finished that project by planting large numbers of trees and understory shrubs. Since then, planning for three new landscape and collections projects has been underway.

In collaboration with the Boston Parks and Recreation Department and under the design supervision of landscape architect Carol Johnson,

the Arboretum will construct new gates at the Bussey Street entrance to the grounds. The project will also involve restoring stone walls at the edge of the Arboretum and, by removing unneeded roadway surface, creating several acres of grounds newly available for collections.

The Stony Brook Marsh project is also a collaboration with Boston Parks and Recreation and a group of interested friends called the Arboretum Park Conservancy. The plans for this project, which are still being completed by consulting landscape architect Nina Brown, call for a pedestrian-scale pathway between the Forest Hills subway station and the South Street entrance to the grounds. The curvilinear passage will run through a fifteen-acre wetland, marking the intersection of Bussey Brook as it connects underground with Stony Brook. The construction will include two new sets of fabricated metal gates, stone piers, and related stone walls. Over the next decade, the Arboretum will further improve the management of vegetation on this newest addition to our landscape.

The last landscape project—perhaps the most significant of the next century—is a new shrub and vine collection to be developed on four acres of under-utilized land northeast of the Dana Greenhouse. For nearly twenty years the Arboretum has lacked a place to display the sun-loving shrubs and trellised vines that hold such great horticultural interest for the public. We began planning this collection in 1997 with Douglas Reed Landscape Architects in association with Gary Hilderbrand, professor at Harvard's Graduate School of Design, and Maryann Thompson, architect.

Located on land adjacent to the Olmsted-designed park, this garden space will feature a series of terraces carved out of a sloping hillside below the existing bonsai pavilion. The passageway into the garden will be defined by a five-hundred-foot-long stone retaining wall that supports vine-covered trellises. This long wall will lead to an arbored pavilion, an open-air structure that will also display vines and provide a place of shade looking out over the terraced beds and a central lawn, a swath of sloping greensward that bisects the terraces and leads visitors back into the Arboretum.

This garden will permit the Arboretum to display taxa that are difficult to site elsewhere on the grounds. There will be space for approximately 300 to 400 types of sun-loving shrubs and 75 to 100 kinds of climbing vines. Consistent with our overall collections policy, about half the space will be devoted to specimens grown from seed collected

Dave Desroches Photography

A scale model of the planned shrub and vine collection. The pavilion is at center right; the 1961 bonsai pavilion is above the long wall, right of center.

in the wild. The remaining collections will feature temporary cultivar displays that are replaced every five to ten years by other selections. The horticultural diversity of the Shrub and Vine Garden will create opportunities for new educational programs of great interest to landscapers and dedicated amateur plantspeople. It will be a very special destination for the visiting public.

Following is a list of some of the shrub and vine genera that are being considered for the Garden:

Shrub genera

Buddleia
Buxus
Cissus
Cotoneaster
Daphne
Diervilla
Deutzia
Euonymus
Hamamelis
Hibiscus
Hydrangea
Hypericum
Ilex
Indigofera
Lespediza
Lindera
Lonicera
Pyracantha
Ribes
Viburnum
Vitex

Vine genera

Actinidia
Ampelopsis
Bignonia
Campsis
Clematis
Hedera
Hydrangea
Lonicera
Menispermum
Rosa
Schizophragma
Tripterygion
Wisteria

EDUCATION

The twin anchors of our educational programs are the adult classes and the Field Study Experiences for children. The former provide continuing instruction in botany, horticulture, and design history. During the past two years, participation in these evening and weekend classes has remained steady, with about 1,850 participants in 114 different courses each year.

In 1998 the field excursions offered to elementary schoolchildren were completely reviewed and revised to sharpen their goals and to ensure that the approach used was consistent with current ideas about science education. These programs continue to serve about 130 classes

annually (2,800 students), with approximately half coming from public schools in Boston and Chelsea.

During the past five years, the Arboretum has explored new ways of working with schools. Supported by a grant from the National Science Foundation (NSF), the Community Science Connection project developed a model program that would use the Arboretum's resources (both personnel and grounds) to improve the science education practices in local elementary schools. Under the direction of Candace Julyan, this project increased teachers' understanding of and interest in science and incorporated extended scientific study into classroom practice. The focus of these efforts is concentrated on an understanding of trees, first for the teachers and then for their students.

Consistent with the intent of NSF grants, the project focused on several questions about teaching science in elementary schools: How can institutions such as the Arboretum help teachers increase their personal knowledge and appreciation of science? Is it feasible for teachers to incorporate a yearlong, observation-based study of trees into their science curriculum? What role might an interactive website environment play in supporting such a classroom and schoolyard-based study? Can we develop a model for a new approach to working with schools that will be valuable for other botanical institutions?

As we came to the end of the project in 1999, some initial answers to these questions began to emerge. Botanical institutions can best facilitate science education by encouraging teachers and their students to repeatedly observe and collect data about seasonal change in natural phenomena such as spring flowering, summer fruit development, and autumn loss of leaves. This implies that annual visits to a nature setting are not very effective for understanding phenomena scientifically. Rather, looking closely at trees in an outdoor setting throughout the seasons offers a rich and rewarding scientific study. In addition, we believe that computer technology can best support learning in both the classroom and outdoor environments by allowing teachers, students, and botanical institutions to share data and to communicate interactively. These repeated interactions with nature and each other will build a child's (and a teacher's) capacity for understanding science. And, finally, we were gratified that several other institutions (Descanso Gardens in California, Minnesota Landscape Arboretum, and the Massachusetts Audubon Society) elected to incorporate our model into their 1998–1999 programming and future planning.

The Arboretum will continue to investigate the role of nature study in science education through a planning grant awarded in the fall of 1999 by NSF. With this new grant, we will begin to define how the creation of a schoolyard arboretum—a collection of trees specially selected for observation and measurement over time—can serve to facilitate the study of nature and to advance the understanding of science.

A. Kirstin Behn

The Field Studies Experience program brings schoolchildren close to trees.

The teaching of Harvard University courses by staff further strengthens the Arboretum's relationship to the University. Phyllis Andersen and Karen Madsen have been long-time instructors in the Radcliffe Seminars Program in Landscape Design, teaching courses in landscape history. For the past six years, Peter Del Tredici has taught plant biology and horticulture to landscape architecture students in Harvard's Graduate School of Design. Candace Julyan's teaching at the Graduate School of Education for the past four years has included courses on the integration of computer technology into classroom practice and on distance learning using computer networks and the Worldwide Web. This year she is teaching a new course on the relationships among nature study, science education, and environmental education. We also anticipate that a growing number of graduate students in education will be working with programs at the Arboretum.

INSTITUTE FOR CULTURAL LANDSCAPE STUDIES

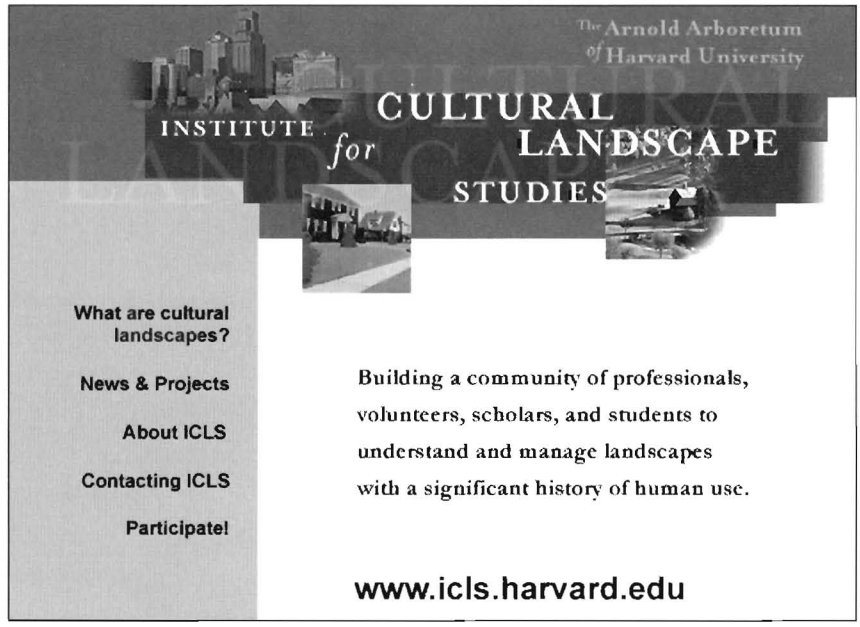
Nineteen ninety-seven also saw the conclusion of a six-year collaboration with the Olmsted Center for Landscape Preservation of the National Park Service. Originally expected to mature into a full partnership between the Arboretum and the Park Service, the collaboration ended because issues of financing, governance, and institutional culture created insurmountable barriers to partnership. As a consequence, the

Arboretum decided in November 1997 to launch its own enterprise, the Institute for Cultural Landscape Studies, under the direction of landscape historian Phyllis Andersen.

The new Institute has a much broader mission than that of the National Park Service collaboration, which focused solely on historic landscapes. It will integrate three disciplines that have traditionally been considered separate: historic preservation, land-use planning, and species conservation. The anticipated audience includes staff members of nonprofit, land-management organizations such as land trusts and government agencies, as well as the many citizens who voluntarily serve on the boards of these organizations or on local government commissions. The Institute will develop and disseminate information that will increase the capacity of this audience to critically analyze land-use issues and to make informed decisions.

The medium for connecting with this audience is the Worldwide Web (www.icls.harvard.edu). Great effort has been devoted to designing a website that ensures easy navigation and efficient access to key information and related print and web resources, as well as to other practitioners. Initial publications on the site have included an analysis of the language of cultural landscapes; an evaluation of geographical information systems (GIS), the software that supports land management; a discussion of the value of public-private partnerships for land protection and management; and a critical essay on the preservation of working landscapes such as farmland and production forests. As the site grows, it will become a forum for additional analyses of land-management issues, case studies, contributed essays, and roundtable discussions with opportunities for audience participation. To guide the Institute's evolution, we have engaged the Conservation Company, a strategic planning consultancy, to evaluate the program's efforts to date in meeting the needs of our target audiences.

Over a century ago, in October 1887, Charles Sprague Sargent began publication of a new journal, *Garden and Forest,* dedicated to assembling in one place information on three distinct topics: horticulture, landscape art, and forestry. Issues of the magazine appeared weekly for the next ten years, and the essays it contained were immensely influential in shaping the traditional fields of botany and horticulture, and in promoting the new fields of historic preservation, parkland development, landscape architecture, and scientific



forestry. The Institute for Cultural Landscape Studies has been created in a similar spirit, focusing on different fields and using a very different medium, but with the same commitment to quality and long-term influence.

INTERNATIONAL RESEARCH

"Inventory of Plant Resources of West Kalimantan (Indonesian Borneo)" is the title of the collecting project funded by the National Science Foundation with $790,228 between September 1992 and February 1998. John Burley was the principal investigator of a project designed to survey plants in two national parks in Indonesia and to facilitate scientific collaboration and transfer of technology between the Arboretum and Indonesian scientific organizations.

During this time, Arboretum staff collected 5,670 vascular and nonvascular plant and fungus specimens, representing 2,148 taxa belonging to 198 families and 808 genera. At least eight new species were discovered.

The project also developed a database model and prototype database designed to facilitate worldwide access to information about these collections over the Internet. The model and prototype were

formally adopted by the Herbarium Bogoriense as the foundation for the Biodiversity Collections Project funded by the World Bank (see below).

Finally, for use over the Internet by scientists around the world, the project developed two interactive keys, one to the tree and shrub genera of Borneo, another to the figs of Gunong Palung National Park in Borneo.

Late in the summer of 1998, Harvard University, acting on the advice of the Arnold Arboretum, terminated a contract with the Government of Indonesia under the terms covering "force majeure," bringing to a premature end our advisory role in the Biodiversity Collections Project, funded and managed by the World Bank. The immediate impetus for this action was the rapid economic decline and political turmoil that engulfed Indonesia in the spring of that year, leading to killings and street riots that threatened the safety of Arboretum staff and other expatriate advisors in the country. However, this turmoil, the subsequent outcry over pervasive government corruption, and the fall of the Suharto regime were indicative of problems that had plagued the project from its inception in 1994.

The original intent of the Biodiversity Collections Project was to build on the successful, five-year, NSF-funded collecting program described earlier. The project was expected to create a national electronic database for Indonesia to facilitate access to this information about its biodiversity.

The specific goals of the Biodiversity Collections Project, established by John Burley, were: 1) to design and procure new storage and curatorial systems for the zoological and botanical collections of Indonesia; 2) to develop and publish guidelines for improved curatorial procedures; 3) to create a biodiversity information management system; 4) to train curatorial staff and research scientists; and 5) to initiate international collaborations for research and scientific exchange. A grant to the Government of Indonesia of $12,000,000 was allocated by the World Bank, through its Global Environment Fund, for a six-year program to restore deteriorating zoological and botanical collections critical to conservation of biodiversity and economic development. The Government of Indonesia, in turn, awarded a $2,400,000 contract to Harvard University to provide technical assistance through the Arnold Arboretum in collaboration with colleagues from England and Australia.

While the project achieved a number of its goals in its first three years (1994–1997), prior to the instabilities in Indonesia, there were growing indications that systemic problems would combine with the volatile political circumstances and the economic difficulties of 1998 to unravel these accomplishments and undermine any hope of success. Ongoing deficiencies in local coordination and communications placed great pressure on the advisory role of Arboretum staff and collaborators. The lack of local technical skills, especially in the area of modern information management systems, constituted a serious obstacle to the creation of a biodiversity database system. Funds allocated to the project displayed a mysterious and chronic lack of availability. Reimbursements for technical advisory services were long delayed, creating a financial risk for the Arboretum that at one point approached $500,000. Finally, a midterm analysis of the project's goals and the remaining funds forced the Arboretum to recommend a drastic reorganization of priorities to the Government of Indonesia and the World Bank. This recommendation was not accepted by project officials. With little hope of accomplishing even limited goals, with increasing financial and safety risks, and with deep regret, I made the decision to terminate the contract two years before completion.

There are many hard lessons to be learned from this experiment in technical assistance and international cooperation, not the least of which is that work in developing countries is by its nature unpredictable, and that associated risks—financial, political, and personal—are inevitable. The failure of the Biodiversity Collections Project, despite its ambitious and idealistic aspirations, represents a significant setback for the long-term goals of the Arboretum in Southeast Asia.

At the end of 1999, Peter Shaw Ashton, former director of the Arnold Arboretum, retired as the Charles Bullard Professor of Forestry in the Faculty of Arts and Sciences at Harvard University. He has assumed emeritus status as a University Research Professor and will continue to oversee a long-term collaboration with the Center for Tropical Forest Science of the Smithsonian Institution for research on the tropical forests of Asia. Begun in 1984, this work is now yielding deep insights into the dynamics and diversity of these rich evergreen forests and the silvicultural management required to sustain long-term timber production and related economic benefits in developing countries.

At the core of the program are six large research plots in pristine tropical forests that experience a range of soil conditions, topography, rainfall seasonality, and frequency of natural disturbance. Each plot is 50 hectares (124 acres) in size, with up to 400,000 trees greater than one centimeter in diameter and representing as many as 2,500 species. A complete demographic census every five years collects data on the recruitment of new individuals and species in each plot, the death of individuals previously counted, and the growth rate of individual trees. Recently, studies have been initiated on the seasonality of flower and fruit production and the biology of seedlings on the forest floor. In total, two and a half million plants are being individually mapped and monitored over time.

This huge demographic database is the basis for detailed computer models that can simulate the changing structure and composition of each forest for periods as long as 300 years. The models have revealed the critical role played by seasonal patterns of rainfall in supporting the rich species composition of these forests, as well as the secondary roles played by soil fertility, biogeographic history, and severe natural disturbance such as fire or drought. In turn, these findings inform management policies for silvicultural protocols and for selecting indigenous species for plantations. Combined with analysis of the market value of forest products, this research has led to a preliminary conclusion: the sustainable harvesting of evergreen tropical forests cannot be economically viable without crediting the value of the forests' "ecosystem services," such as carbon sequestration, water and soil conservation, and the preservation of biodiversity. Because these "services" ordinarily escape economic valuation and are not paid for, they are normally not accounted for and will inevitably decline under traditional forestry practices.

The remarkable value of this longterm research, in an area of the world that is central to the mission of the Arnold Arboretum, fulfills the original vision of the Arnold trustees who gave funds to Harvard University for our first endowment. By linking the country's finest academic institution to a new organization dedicated to research and education about trees, those trustees ensured a commitment to the highest quality of work and made an investment in the scientific study of critical environmental issues.

ADMINISTRATION AND DEVELOPMENT

From the perspective of almost everyone involved with the Arnold Arboretum, the basic administrative systems remain virtually invisible. Some of these systems are internal: supervisory relationships, facility and supply management, and the weekly meeting of the executive committee, which includes me and the five staff members who report to me directly. Other systems involve the University to a greater or lesser degree. Most of these are financial in nature: the management of federal grants; gift processing and investment of endowment; budget monitoring and capital project oversight. All these systems are the domain of Frances Maguire, our director of administration for the past twelve years.

Frances Maguire was named the Arnold Arboretum's 1998 Harvard Hero in recognition of her exceptional contributions as director of administration.

In 1997, the University began replacing the basic financial systems in use for the previous half century. The new system, aptly called ADAPT, went online last summer; it functions entirely through elec-

Summary of Operations

	FY 1997	FY 1998	FY 1999
Income			
Endowments	4,089,011	4,421,289	4,645,500
Membership/Gifts	659,603	703,416	897,435
Enterprise	191,247	155,816	134,832
Grants	1,423,240	530,556	386,612
Education/Publications	72,704	70,437	77,434
Total Income	**6,435,805**	**5,881,515**	**6,141,813**
Expenses			
Salaries	3,005,791	3,276,588	3,201,930
Supplies/Equipment	578,639	528,031	508,228
Facilities/Operations	467,639	478,509	497,321
Services	1,399,506	811,324	727,001
Travel	128,256	99,140	53,697
Total Expenses	**5,579,830**	**5,193,592**	**4,988,177**
Excesses (Losses)			
Unrestricted Excess (Loss)	312,416	0	0
Restricted Excess (Loss)	543,559	687,923	1,153,636
Operating Excess (Loss)	855,975	687,923	1,153,636
Debt Payment	312,416	312,416	312,416
Total Excess (Loss)	**543,559**	**375,506**	**841,220**
Total Fund Balances	**1,067,825**	**1,490,555**	**2,026,791**

tronic transactions over the Internet. Like new, tight-fitting shoes, ADAPT has created numerous sore blisters and aching bones, particularly for those members of our financial staff who believe their job is to facilitate the work of everyone else. Recently Frances was recognized by the Arboretum and the University for her outstanding patience and persistence in adapting our local circumstances to the unforgiving structure of Harvard's new financial systems.

The good news being delivered by these systems is revealed in the Summary of Operations. Over the last five years, endowment income has increased by 35 percent, while gift income has increased by more than 300 percent over the same period. At the same time, staff-related expenses (the largest expenditure in the budget) have increased by only 8 percent, reflecting a decline in the number of staff. As a result, the Arboretum is experiencing healthy operational surpluses each year, most of which are reinvested in the endowment. Over the past five years, we have increased it by $3,700,000.

A second conspicuous trend is the decline in grant support, which is mirrored in the decrease in grant-servicing expenditures. This decline resulted from the dissolution of our activity in Indonesia, although the close of our children's education grant from NSF also contributed to this trend. Continuing federal grant support is critical to the national and international reputation of the Arboretum. Rebuilding this source of support will require us to design new programs, preferably in close collaboration with the Harvard University Herbaria.

THE CAMPAIGN FOR THE ARBORETUM

In 1988, after several years of financial difficulty, the Arboretum was removed from the Faculty of Arts and Sciences and repositioned under the Vice President for Administration (VPA) of the University. The significance of our successful role in the Harvard University Campaign can best be appreciated in light of this change in administrative structure.

Before 1988, fundraising for the Arboretum was the province of the Dean of the Faculty of Arts and Sciences and his staff, and the Arboretum's needs were not a priority for development. Following the administrative shift to VPA in 1988, the Arboretum found itself in a department with no history of raising money from individual donors. For the Arboretum at the start of the University Campaign in 1992, this

meant no development staff; no body of research on prospects; no feasibility study of campaign goals; no organized volunteer leadership; and no record of major gift solicitation. At the same time, we were handicapped by a recent, somewhat unhappy reorganization of staff; a three-million-dollar mortgage for the renovation of the Hunnewell Building; and a constituency distinctly distrustful of the University's intentions. On the positive side, the Arboretum had a pool of 2,500 loyal members and a number of active, long-term supporters who remained faithful to the vision of Charles Sprague Sargent.

To her great credit, Sally Zeckhauser, Vice President for Administration, gave full support to the fundraising aspirations of the Arboretum, allowing us to establish a goal of $8,250,000 and to build a development program. Lisa Hastings, now at Boston College, ably led an effort that included staffing a five-person department; building research files on prospects; developing volunteer leadership through the Director's Advisory Board and the Arboretum Council; creating programs funded with external grants; engaging staff in campaign activities; conducting modest media outreach; and, finally, asking for money. Our loyal friends responded.

While the majority of the gifts we received were for the unrestricted endowment, four large restricted gifts will, directly and indirectly, support our research and education mission. The family of George Putnam created a permanent endowment for Katharine H. Putnam Fellowships to allow young and mid-career professionals to use the living collections of the Arboretum for horticultural and botanical research while in residence. A second endowment, created by living descendants of Horatio Hollis Hunnewell, the first patron of the Arboretum, will fund the Isabella Welles Hunnewell Internship Program to bring undergraduate students of horticulture to the Arboretum each summer for three months of work and study on the grounds.

The Nature Study Fund for City Children was established by Nod and Henry Meyer to support the Field Study Experiences program that conducts learning excursions to the Arboretum for students from Boston and Chelsea schools during the school year. Finally, an anonymous bequest will one day endow the horticultural library and archives in Jamaica Plain to support the research interests of students and visitors throughout the Boston region.

Karen Madsen

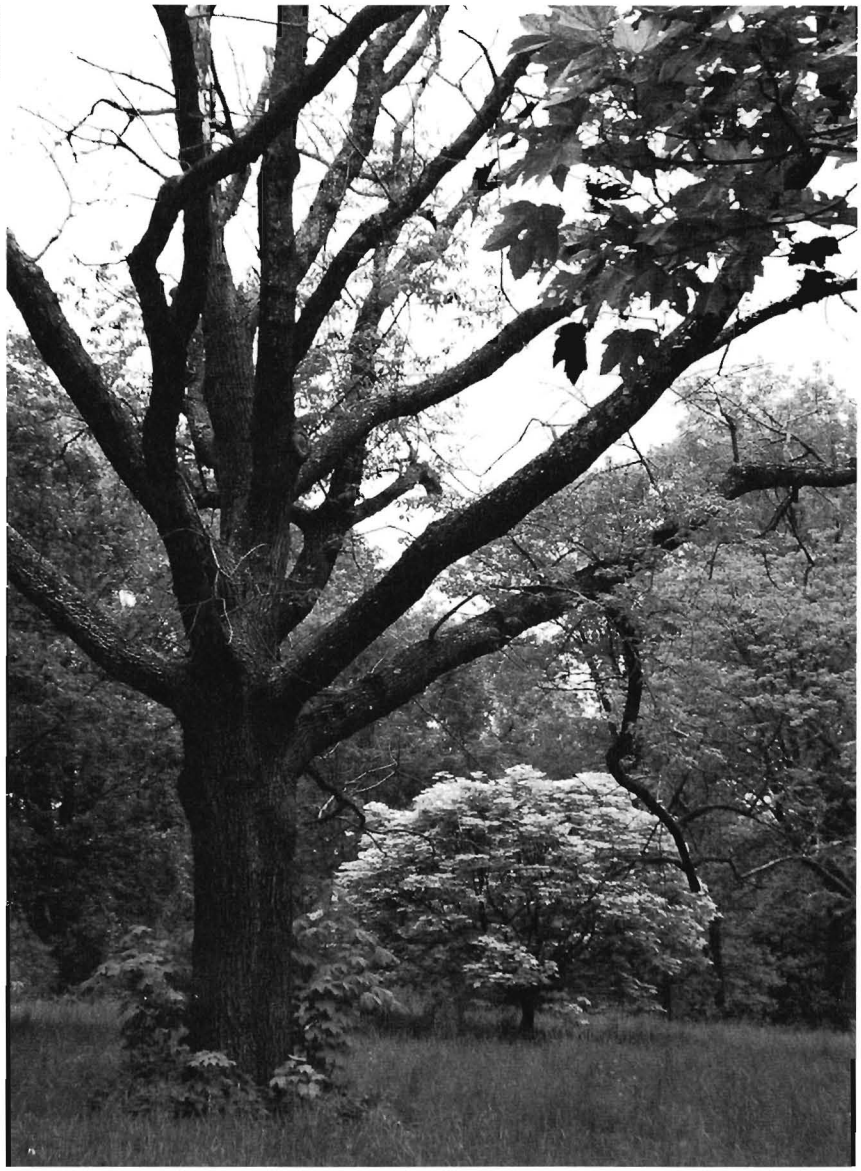
Francis Hunnewell, Lisa Hastings, and Bob Cook celebrate the end of a successful fundraising campaign.

The Arboretum is exceedingly fortunate to have these friends and the many others who made our success in the campaign achievable. Of greater importance is the demonstration that this institution, residing independently under the umbrella of Harvard University, can continue to sustain its unique mission to realize in modern and creative ways a very traditional vision of research and public education about trees.

Bob Cook

March 16, 2000

Karen Madsen



On Peters Hill, an unusually diminutive sycamore maple, *Acer pseudoplatanus* 'Prinz Handjery', can be compared to a *Quercus saulii* of a stature more usual for this maple. The new foliage of this fifty-year-old tree emerges pink, turns bright green.

STAFF OF THE ARNOLD ARBORETUM*

ADMINISTRATION

Rose Balan, Staff Assistant, H.U.H
Donna Barrett, Financial Assistant
Sheila Baskin, Secretary
Kenneth Clarke, Custodian
Robert Cook, Director, Arnold Professor
Anne Marie Countie, Systems Administrator, H.U.H. (appointed 3/9/99)
Matthew Davies, Staff Assistant, Development (left 12/11/98)
Alexander Dukas, Receptionist, H.U.H. (hired 9/29/97–left 8/31/98)
Kelly Harvey, Membership Assistant (left 5/22/98)
Lisa Hastings, Director of Development (left 2/12/99)
Margaret Hedstrom, Development Officer (appointed 9/3/97)
Jon Hetman, Staff Assistant, Development (hired 4/12/99)
Andrew Hubble, Network Systems Manager
Karen Madsen, Editor of *Arnoldia*
Frances Maguire, Director of Finance and Administration
Jude Mulle, Receptionist, H.U.H. (hired 7/15/98)
Karen O'Connell, Membership Coordinator (appointed 7/27/98)
David Russo, Facilities Supervisor (appointed 3/1/99)
Kara Stepanian, Development Assistant (left 5/14/99)

EDUCATION

Ellen Bennett, Manager of Horticultural Information (appointed 7/6/98)
Kirstin Behn, Staff Assistant
Laurie Chidester, Curriculum and Web Specialist (appointed 7/13/98–left 4/28/99)
James Gorman, Staff Assistant (left 6/2/98)
Candace Julyan, Director of Education
Gary Koller, Senior Horticulturist (retired 7/31/98)
Joseph Melanson, Staff Assistant
Lauren Mofford, Field Study Coordinator (left 4/23/98)
Frances K. Morse, Arnold Education Fellow (appointed 10/1/97–ended12/19/97)
Chris Strand, Outreach Horticulturist (left 1/2/98)
Diane Syverson, Manager of School Programs
Pamela Thompson, Adult Education Coordinator

HERBARIUM

David Boufford, Assistant Director for Collections, H.U.H.
Noel Cross, Internet Server/Systems Administrator (transferred 10/19/98)
Susan Hardy Brown, Curatorial Assistant
William Hays, Database Applications Developer, H.U.H. (appointed 3/15/99)
Carolyn Hesterberg, Secretary (left 7/23/97)
Maureen Kerwin, Curatorial Assistant
Walter Kittredge, Curatorial Assistant
William Knox, Systems Administrator (appointed 12/1/98–left 2/12/99)
Emily Wood, Manager of Systematic Collections

INSTITUTE FOR CULTURAL LANDSCAPE STUDIES

Phyllis Andersen, Director of Institute for Cultural Landscape Studies
Alice Ingerson, Senior Publications Officer (appointed 8/4/97)
Kirston Thornton, Landscape Preservation Assistant

LIBRARY

Sheila Connor, Horticultural Research Archivist**
Carol David, Library Assistant
Carol Mita, Library Assistant (left 4/10/98)
Coleen Neary, Serials Assistant (hired 8/24/98–left 11/20/98)
Cathleen Pfister, Serials Assistant (hired 1/21/99)
Christy S. Robson, Serials Assistant (hired 6/7/99)
Gretchen Wade, Library Assistant

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* 1 July 1997 through 30 June 1999

** Sheila Connor relinquished the position of Facilities Manager and became full-time Horticultural Research Archivist when David Russo was hired as Facilities Supervisor on 1 March 1999.

Judith Warnement, Librarian
Elizabeth Wellborn, Archival Fellow (appointed 6/1/99)
Winifred Wilkens, Library Assistant

LIVING COLLECTIONS

Thomas Akin, Assistant Superintendent of Grounds (appointed 3/30/98)
John Alexander, Chief Plant Propagator
Andrew Bell, Curatorial Associate (appointment ended 1/31/98)
Todd Burns, Arborist
Luis Colon, Grounds Staff (left 3/1/99)
Julie Coop, Superintendent of Grounds (upgraded 9/1/97)
John DelRosso, Arborist
Peter Del Tredici, Director of Living Collections
Robert Famiglietti, Grounds Staff
Kirsten Ganshaw, Grounds Staff
Donald Garrick, Grounds Staff
Bethany Grasso, Grounds Staff (hired 8/31/98–left 12/31/98)
Nigel Gurnett, Grounds Staff (hired 8/31/98–left 2/26/99)
Dennis Harris, Grounds Staff
Irina Kadis, Curatorial Assistant (hired 4/26/98)
Susan Kelley, Curatorial Associate
Jianhua Li, Botanical/Horticultural Taxonomist (appointed 4/1/99)
Midori Matsuoka, Apprentice (hired 5/17/99)
Bruce Munch, Grounds Staff
James Nickerson, Grounds Staff
John Olmsted, Head Arborist
James Papargiris, Grounds Staff
Thomas Por, Grounds Staff (hired 4/8/98)
Kyle Port, Curatorial Associate (upgraded 7/1/98)
Maurice Sheehan, Grounds Staff, Working Foreman
Stephen Spongberg, Horticultural Taxonomist (retired 2/28/98)
Lidia Szabo, Grounds Staff (hired 1/12/98–left 5/15/98)
Mark Walkama, Grounds Staff
Thomas Ward, Greenhouse Manager and Propagator
Patrick Willoughby, Superintendent of Grounds (left 5/2/97)
Alistair Yeomans, Apprentice (left 1/6/98)

RESEARCH

Peter Shaw Ashton, Charles Bullard Professor of Forestry
Ann Marie Luciano Bohjalian, Staff Assistant (left 10/21/97)
Laura Tenny Brogna, Putnam Fellow (appointed 9/1/98)
John Burley, Research Director (left 9/30/98)
Stuart Davies, Research Fellow (appointed 10/1/97–ended 10/31/98)
Katherine Gould, Putnam Fellow (appointed 10/1/97–10/31/98)
Diane Holland, Curatorial Assistant (left 6/30/98))
James Jarvie, Research Associate (left 9/24/97)
Cynthia Jensen, Associate Director for SE Asian Program (left 8/5/97)
Elizabeth Kolster, Information Systems Project Manager
Timothy Laman, Research Fellow (appointment ended 12/31/96)
Jianhua Li, Putnam Fellow (appointed 1/1/98–ended 3/31/99)
Carol Line, Mercer Fellow (appointment ended 7/16/97)
Reto Nyffeler, Mercer Fellow (appointed 4/1/99)
Nallamilli Prakash, Mercer Fellow (appointed 6/1/99)
Keiko Satoh, Putnam Fellow (appointment ended 9/30/98)
Peter Stevens, Professor of Biology (left 12/31/98)
Campbell Webb, Mercer Fellow (appointed 11/10/97)

RESEARCH AFFILIATES

Kris Bronars, Arnold Arboretum Associate (appointment ended 5/31/98)
Alexander Brownlow, Arnold Arboretum Associate (appointed 6/28/99)
Philip Cantino, Arnold Arboretum Associate (appointment ended 8/31/97)
Wei Cao, Arnold Arboretum Associate (appointed 3/1/99)
Richard Howard, Professor of Dendrology, emeritus
Shiu-Ying Hu Hsu, Botanist, emerita
Gary Koller, Horticultural Fellow (appointed 1/1/98)

Timothy Laman, Arnold Arboretum Associate (appointed 1/1/98)
Sarah Michaels, Arnold Arboretum Associate (appointment ended 5/31/99)
Bernice Schubert, Curator, emerita
Stephen Spongberg, Curator, emeritus
Kim Tripp, Arnold Arboretum Associate
Richard Uva, Arnold Arboretum Associate
Carroll Wood, Jr., Professor of Biology, emeritus

VISITING COMMITTEE

Joan Morthland Hutchins, *Chair*
Gregory J. Anderson
Henrik Blohm
Christopher S. Campbell
Francis O. Hunnewell
Robert K. Jansen
Matthew J. Kiefer
Ellen West Lovejoy
Janine Evnin Luke
Edith Noyes Knight Meyer
Paul W. Meyer
Roger B. Swain
Morgan Dix Wheelock, Jr.
Paul J. Zofnass
Judith D. Zuk

DIRECTOR'S ADVISORY BOARD

Noni Ames, *Co-chair*
A. David Davis, *Co-chair*
Louis J. Appell, Jr.
Herbert P. Dane
Caroline A. Donnelly
Corliss Knapp Engle
Katherine Ferguson
Francis O. Hunnewell
Emily Lewis
Caleb Loring, Jr.
Ellen West Lovejoy
Janine Luke
Betsy Ridge Madsen
Christopher J. McKown
Henry H. Meyer, Jr.
Frederick S. Moseley, III
Nancy Putnam
Elizabeth C. Sluder
David B. Stone
Mary Ann Streeter
Jeff Tarr

PUBLISHED WRITINGS OF THE ARNOLD ARBORETUM STAFF

J. H. ALEXANDER

1998. A Summary of Graft Compatability From the Records of the Arnold Arboretum. *Combined Proceedings of the International Plant Propagators' Society* 48: 77–89.
1999. Take a New Look at Lilacs. *Fine Gardening* (66): 32–37.

P. ANDERSEN

1999. Charles Sprague Sargent and the Preservation of the Landscape of Mount Vernon or, "If Washington were here himself, he would be on my side." *Arnoldia* 59(3): 2–13.
1997. Principles of Taste [Review of *Accents as Well as Broad Effects: Writings on Architecture, Landscape, and the Environment 1876–1925* by Mariana Griswold Van Rensselaer]. *Arnoldia* 57(4): 30–32.

P. S. ASHTON

1997. South Asian evergreen forests, some thoughts towards biogeographic reevaluation. *Tropical Ecology* 38: 171–180.
1997. Fractal dimensions of the spatial distribution of *Dryobalanops lanceolata* in a tropical rain forest, at Lambir, Sarawak. *Tropics* 7(1/2): 1–8 (with A. Iwasaki et al.).
1997. Multielement analysis in different compartments of Euphorbiaceae species from a tropical rain forest ecosystem in Sarawak, Malaysia. *Tropical Ecology* 38(2): 181–191 (with Breulmann et al.).
1998. A global network of plots for understanding tree species diversity in tropical forests. In *Proceedings of the International Symposium on Measuring and Monitoring Forest*

Biological Diversity: The International Network of Biodiversity Plots, Smithsonian Institution: Man and the Biosphere Program [May 1995], ed. F. Dallmeier and J.A. Comisky. Paris: UNESCO and Parthenon Press.

1998. Niche specificity among tropical trees: A question of scales. In *Dynamics of Tropical Communities*, 37th Symposium of the British Ecological Society, ed. D. M. Newbery et al., 491–514. Oxford: Blackwell Scientific.

1998. Assessing forest diversity on small plats: Calibration using species-individual curves from 50-ha plots. In *Proceedings of the International Symposium on Measuring and Monitoring Forest Biological Diversity: The International Network of Biodiversity Plots*, Smithsonian Institution: Man and the Biosphere Program [May 1995], ed. F. Dallmeier and J.A. Comisky, 247–268. Paris: UNESCO and Parthenon Press (with R. Condit et al.).

1998. Chemical characterisation of Dipterocarpaceae by use of chemical fingerprinting—a multielement approach at Sarawak, Malaysia. *The Science of Total Environment* 215: 85–100 (with G. Breulmann et al.).

1998. Comparative ecology of 11 sympatric species of *Macaranga* in Borneo: Tree distribution in relation to horizontal and vertical resource heterogeneity. *Journal of Ecology* 86: 662–673 (with S.J. Davies et al.).

1998. FORMOSIAC: An individual-based spatially explicit model for simulating forest dynamics in landscape mosaics. *Ecological Modelling* 106: 177–200 (with J. Liu).

1998. Molecular phylogeny of dipterocarp species using nucleotide sequences of two noncoding regions in chloroplast DNA. *Tropics* 7(3/4): 195–207 (with K. Kamiya et al.).

1998. Seedling growth of *Shorea* (Dipterocarpaceae) across an elevational range in Southwest Sri Lanka. *Journal of Tropical Ecology* 14: 231–245 (with C.V.S. Gunatilleke et al.).

1998. Separating signal noise in sampling tropical forest structure and dynamics. In *Proceedings of the International Symposium on Measuring and Monitoring Forest Biological Diversity: The International Network of Biodiversity Plots*, Smithsonian Institution: Man and the Biosphere Program [May 1995], ed. F. Dallmeier and J.A. Comisky, 47–62. Paris: UNESCO and Parthenon Press (with P. Hall et al.).

1999. A global program in interdisciplinary forest research: The CTFS perspective. *Journal of Tropical Forest Science* 11(1): 180–204.

1999. Spatial and temporal impacts of adjacent areas on the dynamics of species diversity in a primary forest. In *Advances in Spatial Modeling of Forest Landscape Change: Approaches and Applications*, ed. D. Mladenoff and W. Baker, 42–69. Cambridge, UK: Cambridge University Press.

1999. Phylogeny of the tropical tree family Dipterocarpaceae based on nucleotide sequences of the chloroplast *rbcL* gene. *American Journal of Botany* 86(8): 1182–1190 (with S. Dayandan et al.).

1999. Simulating effects of landscape contexts and timber harvest on tree species diversity. *Ecological Applications* 91: 186–201 (with J. Liu).

A. BELL

1998. Obtaining and Sharing New Germplasm. *Proceedings, Southern Nursery Association Research Conference* 43: 423–425.

D. E. BOUFFORD

1998. Eastern Asian-Eastern North American disjuncts: Opportunities for further investigation. *Korean Journal of Plant Taxonomy* 28: 41–61.

1998. Atlas of the flora of New England: Poaceae. *Rhodora* 100: 101–233 (with R. Angelo).

1998. *Flora of China*, Vol. 18, editor. Beijing: Science Press, and St Louis: Missouri Botanical Garden (with Flora of China Editorial Committee for Vascular Plants).

1998. *Flora of Taiwan*, Vol. 4, 2nd ed., editor. Taipei: Department of Botany, National Taiwan University (with C.F. Hsieh et al.).

1998. Phytogeography of the Qinling Mountains and a comparison with the flora and vegetation of Japan. In *Sino-Japanese Flora: Its Characteristics and Diversification*, ed. with H. Ohba. *Bulletin, University Museum, University of Tokyo* 37: 51–67 (with T. Ying).

1999. *Flora of China*, Vol. 4, editor. Beijing: Science Press, and St. Louis: Missouri Botanical Garden (with Flora of China Editorial Committee for Vascular Plants).

1999. *Flora of Japan*, Volume IIc, editor. Tokyo: Kodansha, Ltd. (with K. Iwatsuki and H. Ohba).

R. E. COOK

1998. *The Director's Report of the Arnold Arboretum: 1996–1997.* Jamaica Plain, MA: The Arnold Arboretum.

S. DAVIES

1998. Photosynthetic characteristics of nine early-successional *Macaranga* species from Borneo in relation to life-history traits. *Ecology* 79: 2292–2308.

1998. Comparative ecology of 11 sympatric species of *Macaranga* in Borneo: Tree distribution in relation to horizontal and vertical resource heterogeneity. *Journal of Ecology* 86: 662–673 (with P.A. Palmiotto et al.).

1999. A new myrmecophytic, thrip-pollinated species of *Macaranga* from the highlands of Sarawak. *Harvard Papers in Botany* 4(2): 433–437.

1999. New species of *Macaranga* (Euphorbiaceae) from Borneo. *Kew Bulletin* 54: 147–154.

1999. Phenology and fecundity in 11 sympatric pioneer species of *Macaranga* in Borneo. *American Journal of Botany* 86: 1786–1795 (with P.S. Ashton).

1999. Smoke-haze from the 1997 Indonesian forest fires: Effects on pollution levels, local climate, atmospheric CO^2 concentrations, and tree photosynthesis. *Forest Ecology & Management* 124(2/3): 137–144 (with L. Unam).

1999. Leaf size distributions of understory plants in mixed dipterocarp and tropical heath forests of Brunei. *Journal of Tropical Ecology* 15: 123-128 (with P. Becker et al.).

P. DEL TREDICI

1997. Lignotuber formation in *Ginkgo biloba*. In *Ginkgo biloba—A Global Treasure*, ed. T. Hori et al., 119–126. Tokyo: Springer-Verlag.

1998. The ecology and economics of elm replacement in Harvard Yard. *Arnoldia* 58(1): 27–32.

1998. Aging, rejuvenation and propagation in trees. *Combined Proceedings of the International Plant Propagators' Society* 48: 3–8.

1998. The first and final flowering of Muriel's bamboo. *Arnoldia* 58(3): 11–17.

1998. Lignotuber formation in *Sequoia sempervirens:* Development and ecological significance. *Madroño* 45: 255–260.

K. GOULD

1999. Three new species of *Spigelia* (Strychnaceae) from Mexico. *Brittonia* 51: 407–414.

1999. Taxonomy, phylogeny, and the origin of Gulf Coast disjunction in the Coelostylis species complex of *Spigelia*. *Lundellia* 2: 1–13 (with R.K. Jansen).

R. A. HOWARD

1998. Review of *Potions, poisons & panaceas*, by David Eric Brussell. *Wildflower* 14 (4): 45-47.

1998. The St. Vincent Botanic Garden—The Early Years. *Arnoldia* 57(4): 12–21.

1999. Lyman Smith at the Gray Herbarium. *Harvard Papers in Botany* 4(1): 89-90.

1999. The role of botanists during World War II in the Pacific theatre. In *Science and the Pacific War*, R.M. Macleod, ed. Boston: Kluwer, 83-118.

A. INGERSON

1999. Building a Common Language: Changing Approaches to Cultural Landscapes. http://www.icls.harvard.edu/language/hist1.htm.

1999. Public-Private Partnerships for Cultural Landscapes. http://www.icls.harvard.edu/ppp/contents.htm.

1999 Working Landscapes: What Does It Take to Keep Farm Landscapes Working? http://www.icls.harvard.edu/workland/essay1.htm.

1999. Geographic Information Systems for Cultural Landscapes. http://www.icls.harvard.edu/gis/contents.htm (with S. Bernstein).

J. K. JARVIE

1997. Techniques used in the production of an electronic and hardcopy Flora for the Bukit Baka—Bukit Raya area of Kalimantan. In *Plant diversity in Malesia: Proceedings of the 3rd International Flora Malesiana Symposium* [1995], ed. J. Dransfield et al. Kew: Royal Botanic Gardens (with Ermayanti and U.W. Mahyar).

1998. A new species of *Bauhinia* (Leguminosae—Caesalpinioideae) from Borneo. *Kew Bulletin* 53: 495–496.

1998. The habitats and flora of Bukit-Baka Bukit-Raya National Park. *Tropical Biodiversity* 5: 11–56 (with Ermayanti et al.).

1998. Interactive keys, inventory and conservation. *Conservation Biology* 12: 222–224 (with P.F. Stevens).

1998. New species and notes on Violaceae and Flacourtiaceae from Indo-Malesia. *Harvard Papers in Botany* 3: 253–262 (with P.F. Stevens).

1998. A new species of *Poikilospermum* (Urticaceae) from Borneo. *Kew Bulletin* 53: 231–232 (with A.C. Church and P.F. Stevens).

C. JULYAN

1998. Nature Study Moves into the Twenty-First Century. *Arnoldia* 58(3): 18–24.

I. KADIS

1999. *Willows of Russia and Adjacent Countries*, rev. ed., A. K. Skvortsov. Joensuu, Finland: Joensuu University (as English translator).

T.G. LAMAN

1997. Borneo's Strangler Fig Trees. *National Geographic*, April.

1997. Bornean ground-cuckoo observations in Gunung Palung National Park, West Kalimantan. *Kukila: Bulletin of the Indonesian Ornithological Society* 9: 183–185 (with J.L. Burnaford and C.D. Knott).

1998 Key to the *Ficus* species of Gunung Palung National Park, West Kalimantan, Indonesia. http://www.herbaria.harvard.edu/computerlab/web_keys/navikey/figkey.html (with G.D. Weiblen).

1998. Review of *Evolution and Environment in Tropical America*, ed. by J.B.C. Jackson et al. *The Quarterly Review of Biology* 73: 98–99.

1999. Figs of Gunung Palung National Park (West Kalimantan, Indonesia). *Tropical Biodiversity* 5: 247–299 (with G.D. Weiblen).

J.-H. LI

1998. *Metasequoia:* phylogeny, reproductive biology, and ecotypic variation. *Arnoldia* 58(4)/59(1): 54–59.

1999. More molecular evidence for interspecific relationships in *Liquidambar* (Hamamelidaceae). *Rhodora* 101: 87–91 (with M.J. Donoghue).

1999. Phylogenetic relationships of Hamamelidaceae inferred from sequences of internal transcribed spacers (ITS) of nuclear ribosomal DNA. *American Journal of Botany* 86: 1027–1037 (with A.L. Bogle and A.S. Klein).

1999. Phylogenetic relationships of Hamamelidadoideae inferred from sequences of *trn* noncoding regions of chloroplast DNA. *Harvard Papers in Botany* 4: 343–356 (with A.L. Bogle and M.J. Donoghue).

K. H. MADSEN

1999. A Guide to *Metasequoia* at the Arnold Arboretum. *Arnoldia* 58(4)/59(1): 81–84.

1999. Notes on Chinese-American Botanical Collaboration. *Arnoldia* 58(4)/59(1): 12–16.

R. NYFFELER

1997. Notes on the taxonomy of *Austrocactus*. *Cactus Consensus Initiatives* 4: 14.

1997. Stem anatomy of *Uebelmannia* (Cactaceae)—with special reference to *Uebelmannia gummifera*. *Botanica Acta* 110(6): 489–495.

1997. Comparative stem anatomy and systematics of *Eriosyce* s.l. (Cactaceae). *Annals of Botany* 80(6): 767-786 (with U. Eggli).

1997. Noteworthy idioblastic sclereids in the stems of *Eulychnia* (Cactaceae). *American Journal of Botany* 84(9): 1192–1197 (with U. Eggli and B.E. Leuenberger).

1998. The genus *Uebelmannia* (Cactaceae). *Botanische Jahrbücher für Pflanzensystematik* 120(2): 145–163.

1998. A durian by any other name: taxonomy and nomenclature of the core Malvales. *Harvard Papers in Botany* 3(2): 315–330 (with D.A. Baum and W.S. Alverson).

1998. Proposal to conserve *Parodia* against *Frailea*. *Taxon* 47: 475–476 (with U. Eggli).

1999. A new ordinal classification of flowering plants. *Trends in Ecology and Evolution* 14(5): 168–170.

1999. *Notocactus* versus *Parodia*—the search for a generic classification of the subtribe Notocactinae. *Cactus Consensus Initiatives* 7: 6–8.

1999. Phylogeny of the core Malvales: evidence from *ndh*F sequence data. *American Journal of Botany* 86(10): 1476–1486 (with W. S. Alverson et al.).

S. A. SPONGBERG

1998. Threatened Tree Case Study No. 5. *Franklinia alatamaha* Marshall, extinct in the wild: An early example. *Broadleaves* 5: 7–9

1998. The Magnoliaceae hardy in cooler temperate regions. In *Magnolias and their allies: Proceedings of an International Symposium*, ed. D. Hunt, 81–144. Royal Holloway, University of London. International Dendrology Society and The Magnolia Society.

P. F. STEVENS

1997. Amateurs and professionals in British botany in 1858—J.D. Hooker on Bentham, Brown and Lindley. *Harvard Papers in Botany* 2: 125–132.

1997. Antoine-Laurent de Jussieu et le système naturel: comment subdiviser une nature sans articulations. In *Le Muséum au cours de son premier siècle*, ed. C. Blanckaert et al., 241–262. Paris: Muséum National d'Histoire Naturelle.

1998. Cognitive universals, hierarchy, and the history and practice of biological systematics. *Behavioral Brain Science* 21: 590–591.

1998. Mind, memory and history: How classifications are shaped by and through time, and some consequences. *Zoologica Scripta* 26: 293–301.

1998. *Plants and Animals, Form and Relationships* [exhibition catalog]. Cambridge: Botany Libraries, Harvard University Herbaria.

1998. What kind of classification should the practicing taxonomist use to be saved? In *Plant Diversity in Malesia III*, ed. J. Dransfield et al. Kew: Royal Botanic Gardens, 295–319.

1998. The Angiosperm Phylogeny Group: An ordinal classification for the families of flowering plants. *Annals of the Missouri Botanic Garden.* 85: 531–553 (with K. Bremer and M.W. Chase).

1998. Interactive keys, inventory and conservation. *Conservation Biology* 12: 222–224 (with J.K. Jarvie).

1998. Lectotypification of *Clusia major* L. and *Clusia minor* L. *Taxon* 47: 117–122 (with V. Bittrich).

1998. New species and notes on Violaceae and Flacourtiaceae from Indo-Malesia. *Harvard Papers in Botany* 3: 253–262 (with J.K. Jarvie).

1998. A new species of *Poikilospermum* (Urticaceae) from Borneo. *Kew Bulletin* 53: 231–232 (with A.C. Church and J.K. Jarvie).

1998. *Tapeinosperma alatum* (Myrsinaceae): A remarkable new species from Ceram. *Blumea* 43: 347–350 (with D.E. Holland).

K. TRIPP

1997. *The Complete Book of Shrubs*. Pleasantville, NY: Readers Digest/Reed Books (with A. Coombes).

1997. Horticultural applications of *Agrobacterium rhizogenes* ("Hairy root" bacteria): Propagation of difficult-to-root woody ornamentals. *Proceedings of the International Plant Propagators' Society* 47: 527–535 (with A.M. Stomp).

1998. *Ex-situ* conservation of conifers: a collaborative model for biodiversity preservation. *The Public Garden* 13(3): 5–8 (with P. Thomas).

C. STRAND

1998. Asian witch hazels and their hybrids: a history of *Hamamelis* in cultivation. *The New Plantsman* 5 (4): 231–245.

R. UVA

1999. The beach plum, a history and grower's guide. Barnstable, MA: Commonwealth of Massachusetts, Cape Cod Cooperative Extension (with R. Clark and D. Simser).

T. WARD

1999. Indigenous Beauties. *American Nurseryman* 189(11): 36--45.

1998. *Poliothyrsis sinensis. Combined Proceedings of the International Plant Propagators' Society* 48: 148.

C.O. WEBB

1999. Seedling density dependence promotes coexistence of Bornean rainforest trees. *Ecology* 80: 2006–2017 (with D. R. Peart).

Front cover: A scale model of the planned shrub and vine collection. The Dana Greenhouses can be seen at the top. Dave Desroches Photography.

Inside front cover: *Fagus sylvatica* 'Tortuosa' located near the South Street gate. Photograph by Peter Del Tredici.

Inside back cover: *Zelkova serrata* below the greenhouse gate. Photograph by Peter Del Tredici.

Back cover: The linden *(Tilia)* collection, on Meadow Road. Photograph by Robert E. Cook.