



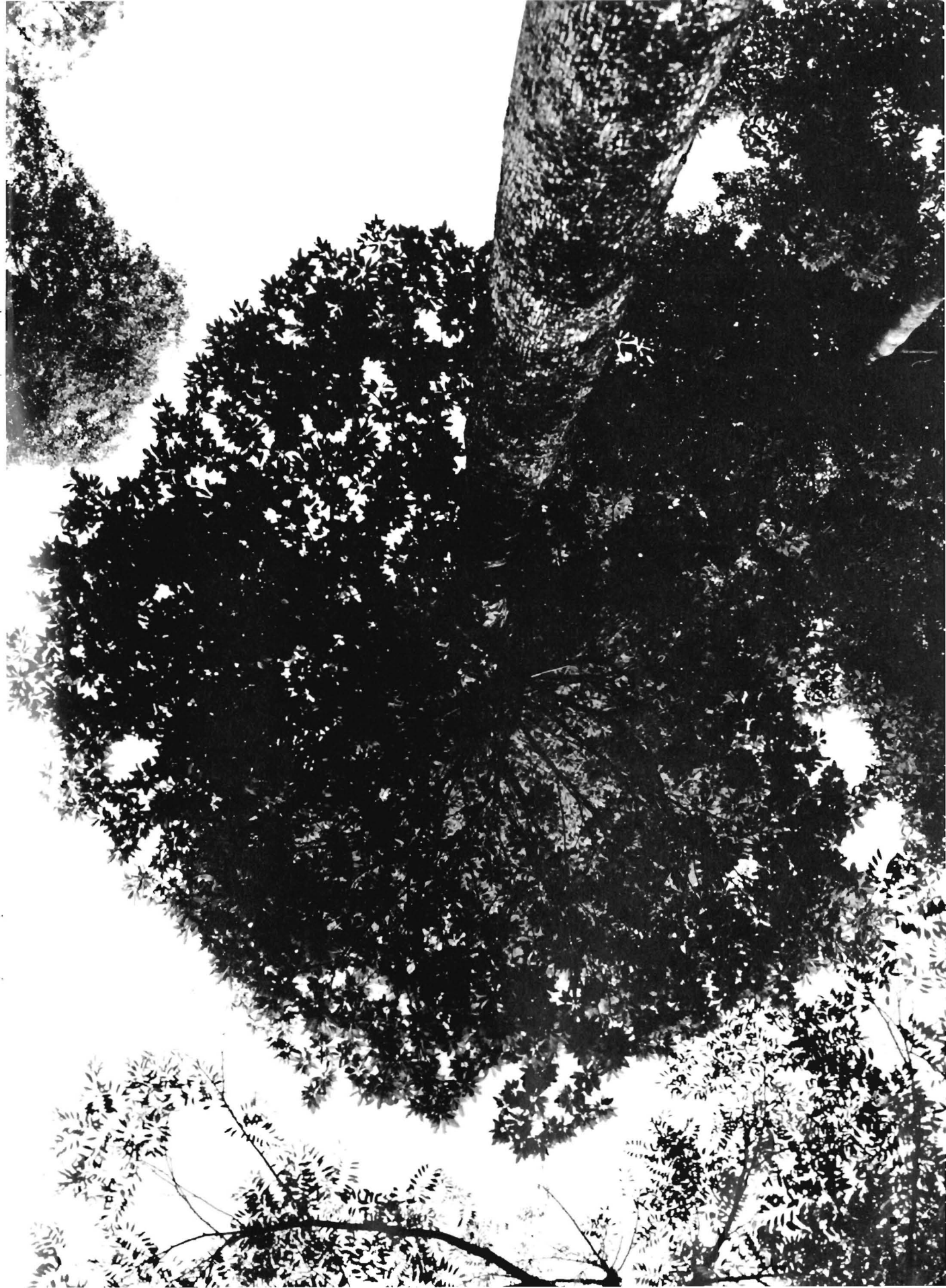
The Director's Report
Arnold Arboretum
1991-1992

Cover: Plant collectors fighting their way upstream through rapids on the Bahau River, central Borneo.
Photo by Andrew McDonald.

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On the far side of the earth, a research site called Bukit Baka lies in the middle of the remote tropical forests of western Kalimantan in Indonesian Borneo. There, working with young Indonesian scientists, Dr. James Jarvie of our staff has been conducting a botanical inventory of the local flora, collecting vouchered specimens, and helping the government of Indonesia to establish a primitive field herbarium. Jim is conducting his plant explorations at the request of the United States Agency for International Development, who have come to recognize that biological surveys are critical to the sound management of natural resources and the preservation of biological diversity in developing countries. Jim's inventory will also add collections to the extensive holdings of the Arnold Arboretum and will increase our knowledge of tropical botany in a little-known region of the world.

As the caretaker of this country's most significant collection of temperate woody plants, I am often challenged to justify the use of Arboretum funds for research in tropical botany thousands of miles from Boston. In answering this challenge I turn to the first director of the Arboretum, Charles Sprague Sargent, who in 1922 reviewed the first fifty years of the Arboretum he created and who then laid down a prescription for the years to come:

In discussing the future of the Arboretum and its needs it must be remembered that during its first half century it has been managed not merely as a New England museum but as a national and international institution working to increase knowledge of trees in all parts of the world and as anxious to help a student in Tasmania or New Caledonia as in Massachusetts. An institution with such ambitions must be equipped to answer any question about any tree growing in any part of the world which may be addressed to it. . . . [T]he work which [the Arboretum] has accomplished in its first fifty years in North America and the Japanese Empire should be extended over the rest of the world. For the trees of the tropics this is now important as tropical forests are fast disappearing to make room for plantations of rubber-producing and other economic plants. . . . [I]n the future the student of trees must depend for any knowledge of many trees on the material and information preserved in institutions like the Arnold Arboretum. The exploration of the tropical forests of the world will require perhaps a century and a large expenditure of money to accomplish. It is work that this Arboretum should begin and steadily push forward.*

* *Journal of the Arnold Arboretum* 3 (3): 169, 170.

Facing page: *Palaquium*, native to Borneo and a member of the Sapotaceae, a family that is also known as guttapercha, sapodilla, or chicle and provides the chief ingredient in chewing gum. Photo by Andrew McDonald.

This charge has been continuously implemented in the work of subsequent directors: E. D. Merrill in the Philippines; Dick Howard through his Caribbean *Flora of the Lesser Antilles*; Peter Ashton's tropical forest research throughout Southeast Asia. Trees from these regions cannot, of course, be grown outdoors in Boston. But the extensive collections of dried herbarium specimens, together with our accumulated library holdings, represent the most important resource for Asian botany in North America.

Today as we face a dramatic loss of thousands of plant and animal species through the destruction of tropical forests, the Arboretum, now more than ever, has an obligation to use its expertise and its assets to help developing countries better manage their biological resources. Through effective collaborations with federal and private funding agencies, this work need not conflict with the ongoing, and primary, commitment of the Arboretum to manage and expand its living collection of temperate woody plants for research and instruction.

Because we aspire to "increase knowledge of trees in all parts of the world," this annual report will pay special attention to the international importance of the Arboretum and the opportunities, especially in Asia, that lie before us.

LIVING COLLECTIONS

The total number of plants (or single taxon groups) tracked in our living collection database increased to 14,889 last year. This includes the addition of 414 accessions (833 plants) to the grounds, of which 103 accessions were new taxa for the Arboretum. Approximately half of these accessions are species of plants with a distribution outside North America; of these, three-quarters are found in Asia.

Prior to establishment in our living collections, taxa are also accessioned into the greenhouse as seeds, plants, or cuttings. Last year 639 accessions arrived from our own collections, other U.S. sources, and 10 foreign countries. Nearly 45% represent new taxa destined to be added to the collections, and 23% were repropagations of taxa already here. The greenhouse also shipped 1285 items of plant material to botanic gardens, nurseries, and research stations in the U.S. and 17 foreign countries. Additional distributions of *Acer heldreichii*, *Securinega suffruticosa*, and *Heptacodium miconioides* were also sent out.

Last year also saw some administrative changes in the Living Collections department. Jack Alexander returned to full-time propagation work, and Tom Ward has assumed day-to-day management responsibilities for the greenhouse and nursery. Rob Nicholson resigned to accept a position as manager of the greenhouses at Smith College. Gary Koller, wishing to pursue his private design business, requested a reduction in his time commitment to the Arboretum and has accepted a position as Senior Horticulturist at half time. Consequently Dr. Peter Del Tredici has been appointed Assistant Director for Living Collections (see Organizational Structure, page 20).

These administrative changes have coincided with several planning and implementation projects in the landscape. A new 3600-square-foot South Nursery, with associated irrigation and access road, was created last spring to permit fallow rotation of a portion of the nursery, higher quality care for nursery plants, and expanded collections. Dr. Steve Spongberg has also developed a detailed, long-range management plan for the Bradley



The Bradley Garden of Rosaceous Plants. Photo by Rácz & Debreczy.

Garden of Rosaceous Plants; this document will become the model for similar plans addressing the needs of other collections at the Arboretum. Finally, with grant funding from the Institute of Museum Services, Steve has also completed a curatorial review of our entire gymnosperm holdings. This evaluation will provide a blueprint for future additions to the collection.

Following a decision last year to reassign members of the grounds crew from the Case Estates to the collections in Jamaica Plain, we now have sufficient personnel to dedicate individual crew members to the management of defined locations in the landscape, such as the Bradley Garden. This has resulted in a significant improvement in the quality of grounds and plant care that has been evident to many visitors over the past year.

Testament to these changes came last July when the Arboretum was honored with the Best Maintained Open Space Award by the City of Boston. Through its collaboration with us, the City also completely resurfaced the road and sidewalks on Bussey Hill. Finally, high-quality horticultural care inevitably requires high-quality equipment; last March we purchased a new 310D John Deere backhoe and loader.

RESEARCH PROGRAMS

Research today, with its requirement for extensive laboratory facilities and supplies, is much more expensive than it was in the days of Charles Sargent. Consequently, income from the endowment of the Arnold Arboretum is not sufficient by itself to sustain major research programs. Therefore we support research projects in two different ways. *Leveraging Funds*, allocated by the director from endowment income to stimulate research, can be used for small-scale projects, for seed money leading to larger programs, and for salary support for short-term research appointments that use the collections of the Arboretum. Large, long-term programs that require expensive facilities or extensive travel and collaboration must secure external *Grant Funds*, usually from outside agencies such as foundations or the federal government.

To give you a better idea of our use of endowment income as leveraging funds, let me discuss three examples that involve the appointment of Katherine H. Putnam Fellows with funds given to the Arboretum by the Putnam family. Dr. Jun Wen, first appointed in the spring of 1991, has been examining the close evolutionary relationship among selected genera of the eastern Chinese and eastern North American floras. This is a scientific

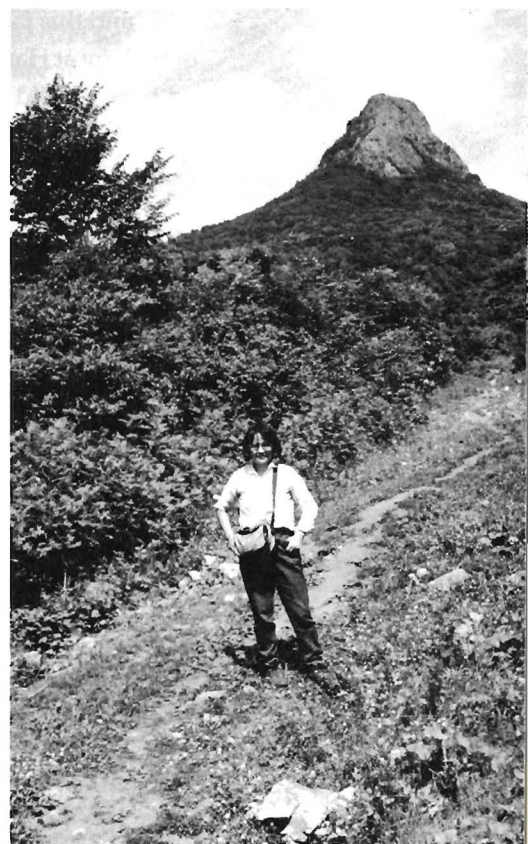
puzzle that was of great interest to Asa Gray and Charles Sargent over a hundred years ago. Jun is combining the techniques of molecular biology with more traditional morphological characterizations to examine *Aralia*, *Panax*, *Nyssa*, *Campsis*, *Hamamelis*, and *Calycanthus*. This past summer, after sampling plants growing in our living collection in Jamaica Plain, she travelled to her native China to collect green tissue in the field, which was frozen in liquid nitrogen. During the coming year she will extract the DNA of these samples for comparative analysis of phylogenies. Her preliminary results indicate that individual genera have evolved independent morphological and genetic patterns rather than a single pattern characteristic of a common phylogenetic divergence in the past. This work has formed the basis for a three-year grant application to the National Science Foundation (NSF).

We are also fortunate that she returned from China with seeds of species for our Living Collections, several of which represent new introductions into North America. As a result of her research, Jun has been offered a senior position in the Beijing Institute of Botany at the Academia Sinica where she will continue to be an important friend of the Arboretum.

Dr. Ki-Joong Kim has used support from the Putnam Fund to conduct a molecular systematic examination of lilacs (the genus *Syringa*). Using the extensive holdings in our living collection, he sampled leaf tissue and extracted DNA from 23 natural species, 20 hybrids, and several related genera in the family Oleaceae. From this he will be creating a comprehensive taxonomic revision of the genus after his return to his native Korea.

A final example is Dr. Elizabeth Kellogg. She was awarded seed money from the Putnam Fund to help her conduct research on the evolution of the wheat tribe, which includes wheat, rye, and barley, as well as a number of poorly known genera (such as *Thinopyrum* and *Dasyphyrum*) that are important sources of genes for disease resistance. She used these funds to hire two Harvard undergraduates as research assistants last year. Additional funds helped her travel to Australia this past summer where she was able to use an automatic sequencing machine that

Jun Wen on a plant-collecting expedition near Maershan in northeastern China.



Herbarium sheets of *Greeniopsis discolor* (Rubiaceae), on the left, and *Mucuna samarensis* (Leguminosae), both collected near Palanan Point in the Philippines. Photo by Susan Hardy Brown.



precisely determines the chemical structure of genes. With the results of this work, Toby was able to successfully compete for a large grant from NSF, and this fall she received an appointment as an Associate Professor of Biology at Harvard University. There she will continue her collaboration with the Arnold Arboretum, thanks to the generosity of the Putnam family.

A Center for Asian Botany

Last year saw an exceptional period of growth for our research programs in the botany of Asia. Work with Chinese scientists on the translation and revision of the *Flora of China* continued through a collaboration with the Missouri Botanical Garden and a number of other botanical institutions in the U.S. and China. The first volume of this multi-volume work covering the Lamiaceae, Verbenaceae, and Solanaceae is scheduled for publication in 1993. This international project brought Professors Hu Chih-ming, curator of the South China Institute of Botany, Guangzhou, and Li Bing-tao of the South China Agricultural University to use the collections of the Harvard University Herbaria (HUH) for several months of research last summer. Professor Chen Jie of the Institute of Botany, Kunming, spent six weeks working on the treatment of Myrsinaceae. In addition, two Arboretum summer interns, Wayne Longbottom (University of Maryland) and Justin Williams (University of Texas) worked on the Primulaceae and Boraginaceae.

The holdings of the Herbaria (HUH) are at the heart of our international efforts to understand the botany of Asian countries. Last year HUH

was awarded a multi-year collections improvement grant from NSF that will support three major projects. First, a Type Specimen Database will be electronically created to incorporate information on the approximately 80,000 types (the actual plant specimen originally used to describe a new species) currently contained in HUH. A second project will establish a Gray Card Index Database and make this available worldwide through the federal government's Internet network. This index, a compilation of plant names cited in the botanical literature, has been updated since 1894 and contains approximately 320,000 cards to be entered into the database.

The final grant project in HUH involves the installation of compactors (movable herbarium cases on tracks), which will permit a tremendous saving of space to ease current congestion and accommodate future collections generated by expanding inventory programs in Indonesia (see page 12).

The HUH collections, which are managed as a unified assemblage, include the Oakes Ames Orchid collections, the Economic Botany collections, the Farlow collections of cryptogamic plants (algae, moss, fungi, etc.), the Arnold Arboretum collections, and the collections of the Gray Herbarium. The HUH serves an international community of botanical scholars through its library and through a vigorous traffic in herbarium sheets sent around the world. Last year over 24,000 specimens were shipped to researchers, 43% of whom were working at 56 different international research institutions. More than 28,600 sheets were returned to HUH.

The combined HUH collections are critical to any research requiring the accurate identification and comparison of species from particular areas of the world. An herbarium collection number begins as a sample of a plant, usually including flowers or fruits, cut and dried by a scientist in the field. This sample is then glued onto an herbarium sheet along with an information label recording taxonomic identification, collector, date of collection, location, and any associated field observations.

Last year our three herbarium mounters and a dedicated corps of volunteers mounted 24,221 sheets. I particularly want to note the tremendous contributions of 5 volunteer mounters who have been working here for nearly a decade: Elaine Foster, Lillian Hagopian, Mary Harrison, Sophie Kulik, and Mima Weissmann. Together they contribute an average of 18 hours a week and mount over 200 plants a month, from bulky tropical specimens to delicate seedlings from the greenhouse. We deeply appreciate their invaluable support.



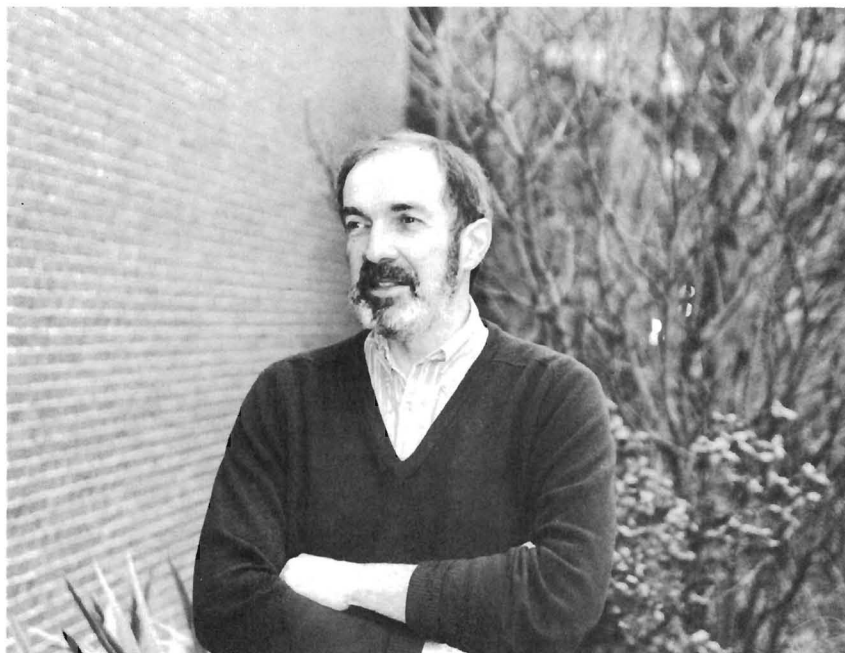
Lillian Hagopian, left, and Elaine Foster, right, are volunteer mounters, both with more than eight years' service. Photo by Susan Hardy Brown.

Operations in the herbarium building in Cambridge are managed by Dr. David Boufford, Assistant Director for Collections and an expert on Asian botany. He oversees the implementation of the NSF grant and the creation of the Type Specimen, Gray Card Index, and the Herbarium Management databases. Equally important as his management responsibilities are his international research interests. In addition to collaborative work with Chinese botanists involving taxonomic revisions of *Pachysandra*, *Mahonia*, *Circaea*, and other Asian genera, Dave is also actively involved in four flora projects: the Flora of China, the Flora of Korea, the Flora of Japan, and the Flora of North America. He is an Associate Curator of the New England Botanical Club, whose collections are managed in HUH, and serves as an editor of their publication, *Rhodora*. He carries on active correspondence with numerous botanical scholars in Asia and is on the Advisory Committee of the XVth International Botanical Congress to be held in Tokyo, Japan, in 1993. Last year also saw the retirement of Mike Canoso after forty years of service to the Arboretum. We wish him well for the future.

The holdings of the combined botanical libraries, which are housed in the HUH building in Cambridge, are also a critical resource for international research. Aably managed by Librarian Judy Warnement, the library contains 259,425 volumes and has an annual expenditure of approximately \$400,000. Last year the library processed 2,287 new books and received 1,269 journals. In addition to a large, but unrecorded number of Harvard students, profes-

sors, and researchers who use the library daily, an additional 1,346 visitors registered at the front desk. Together these users paged 2,536 items from the closed stacks, and 1,233 loans were processed.

While the creation of an electronic database for collections provides an exceptional resource for an individual scientist's own research, it becomes a truly international resource only when it is linked to researchers around the world. Traditionally such linkages were constrained by the limits of overseas mail and problematic telephone communications. With the hiring of Dr. James Beach in 1991 (collaboratively with the Harvard University Herbaria and the Museum of Comparative Zoology), the Arboretum has begun to connect the information in its collections databases to international researchers through a link to Internet, an electronic network established and maintained by NSF to facilitate rapid communications, data transmission, and dialogue. In the near future a scientist in Southeast Asia will have the capability to directly query the library holdings of the Arnold Arboretum or to assess the collection of type specimens in the herbarium. The Internet also permits instant electronic conversations between scientists previously confined to phones and mail. Our efforts in establishing computer networks over the past year are putting the Arboretum at the forefront of communications technology for sharing data and information.



**Dr. David Boufford,
Assistant Director for
Collections, outside the
herbarium building in
Cambridge. Photo by
Karen Madsen.**

Indonesian Biodiversity

In collaboration with the government of Indonesia, a major new program in our Center for Asian Botany is developing long-range plans to survey and conserve the botanical and zoological resources inhabiting this country's tropical rainforests. During the past year the Arboretum was awarded several large grants to support this effort. The National Cancer Institute, for instance, has renewed for three more years our collecting program in Indonesia, which generates botanical samples for screening potential anti-cancer and anti-AIDS compounds for pharmaceutical research. If any active compounds are identified, re-collection of promising candidate species for further research depends critically on accurate documentation. Correct botanical identification is necessarily based on the Arboretum's herbarium and library collections. In addition, the resulting vouchered herbarium specimens add further documentation of a flora that has yet to be fully explored and described, but which is under severe threat from extensive logging operations.

The Arboretum has also been awarded a major grant from NSF and the United States Agency for International Development (USAID) to fund a floristic inventory project in West Kalimantan (Indonesian Borneo) in collaboration with our Indonesian counterpart, the Herbarium Bogoriense. At the heart of this project will be the creation of a floristic database that can begin to provide Indonesian scientists and natural resource agencies with the kind of ecological and distributional information critical to informed decisions for management and conservation of the country's biodiversity.

Additional support for this effort has come through a grant from the Global Environmental Facility (GEF) program managed by the World Bank and the United Nations' Development Program. Working with the Indonesian Institute of Science, the Arboretum coordinated a planning mission in Jakarta last summer that developed guidelines and a timetable for the establishment of a central facility to organize existing and future information on the biological resources of the country. Support from GEF will permit the upgrading of computer facilities at Indonesia's botanical and zoological museums and the creation of a biodiversity database using software specifically designed to integrate biological data into a geographical information system. In addition to expanded field inventories and database establishment, GEF funds will also support the future training of Indonesian scientists who will be responsible for the management and preservation of their country's biological heritage.

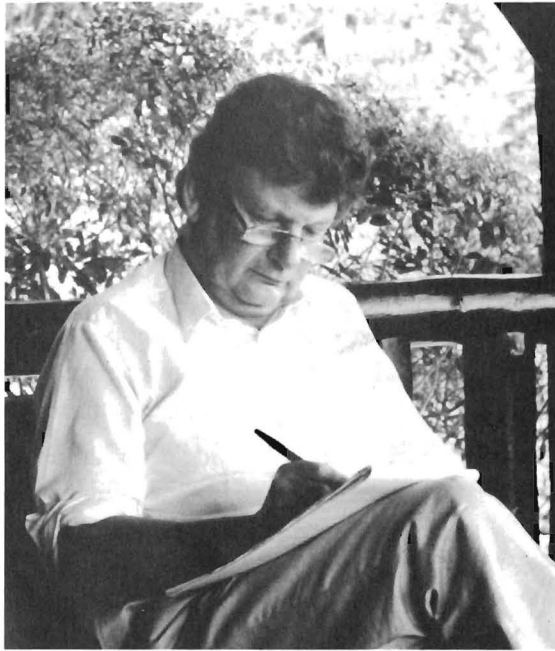
With the award of these grants, the Arboretum has moved to the forefront of botanical inventory and information management in Indonesia. This program will lead to expanded opportunities for research using the collections of the Arboretum and a growing international collaboration with the government of Indonesia for the conservation of one of the richest concentrations of biodiversity in the world.

Long-Term Ecological and Management Research

During the past year, Professor Peter Ashton, who holds a joint appointment at the Harvard Institute for International Development, has continued to establish a network of long-term research sites in Asia that display the major conditions of evergreen tropical forests in this region. Through detailed demographic and species-based studies of large experimental and control plots, researchers will be able to assess both the biological and economic value of these forests and to construct predictive models to optimize forest management. Four sites have been established in Malaysia, Thailand, and Sri Lanka; plans for six other sites (India, Sri Lanka, China, Vietnam, Indonesia, Philippines) are being developed.

A camp in Riau Province, central Sumatra, Indonesia, where John Burley and colleagues from the Herbarium Bogoriense were collecting plant material for the National Cancer Institute for anti-cancer and anti-AIDS screening. Photo by John Burley.





Professor Peter Ashton in Puncak, Java, Indonesia. Photo by John Burley.

Such an extensive network of international sites requires an equally large network of cooperating and funding institutions. At all sites, in-country scientific organizations are major collaborators. Participation by United States scientists is being managed cooperatively with the Smithsonian Center for Tropical Forest Science. Funding for this international effort has also been received from NSF, USAID, the Rockefeller Foundation, the John Merck Fund, the Alton Jones Foundation, UNESCO, the Commonwealth Foundation, and the Conservation, Food, and Health Foundation. Professor Ashton was also honored in the past year by being designated the Charles Bullard Professor of Forestry by the Dean of the Faculty of Arts and Sciences.

PUBLIC PROGRAMS

Because our programs for the public are focused on local and regional audiences, they lack the same international dimension that would fit easily into the theme of this report. Nonetheless, public programs serve as a vital vehicle for communicating the international importance of the Arboretum and convincing potential supporters that an international perspective has always been at the heart of the Arboretum's mission. While my report of last

year's activities in our public programs will be relatively brief, I plan to devote next year's report to the theme of education and public service.

As a product of our planning efforts during the past year, we have come to recognize three audiences served by our local programs. The traditional botanic garden audience consists of dedicated amateur and professional gardeners and horticulturists who enjoy our adult education offerings, the publication of *Arnoldia*, and the practical experience we provide through our intern program. Residents of our neighboring communities make up a second audience. They come to the Arboretum to experience a beautiful sanctuary protected from the urban congestion that surrounds us. They are the beneficiaries of Frederick Law Olmsted's original vision for the landscape. We serve them through our commitment to a higher quality of care for the grounds consistent with the historical integrity of Olmsted's design. More importantly, they and their descendants are further served by our Children's Program when we communicate educational and aesthetic values to several thousand schoolchildren and their teachers each year. A final audience, growing in numbers and often including international travelers, consists of visitors who come to learn more about the institution, its collections, and its history.



Visitors near Dawson Pond below the Arboretum's Forsythia Collection. Photo by Rácz & Debreczy.

Traditionally the Arboretum has served the first audience, and they remain a high priority. Because of the importance of our location in the city of Boston and the growth of our national and international reputation, we now seek to broaden our outreach, strengthen our bonds with the community, and assume more responsibility for the educational interests of our visitors. To this end, we have received grants in the past year from both the National Endowment for the Arts and the National Endowment for the Humanities to develop plans that will serve this broader public.

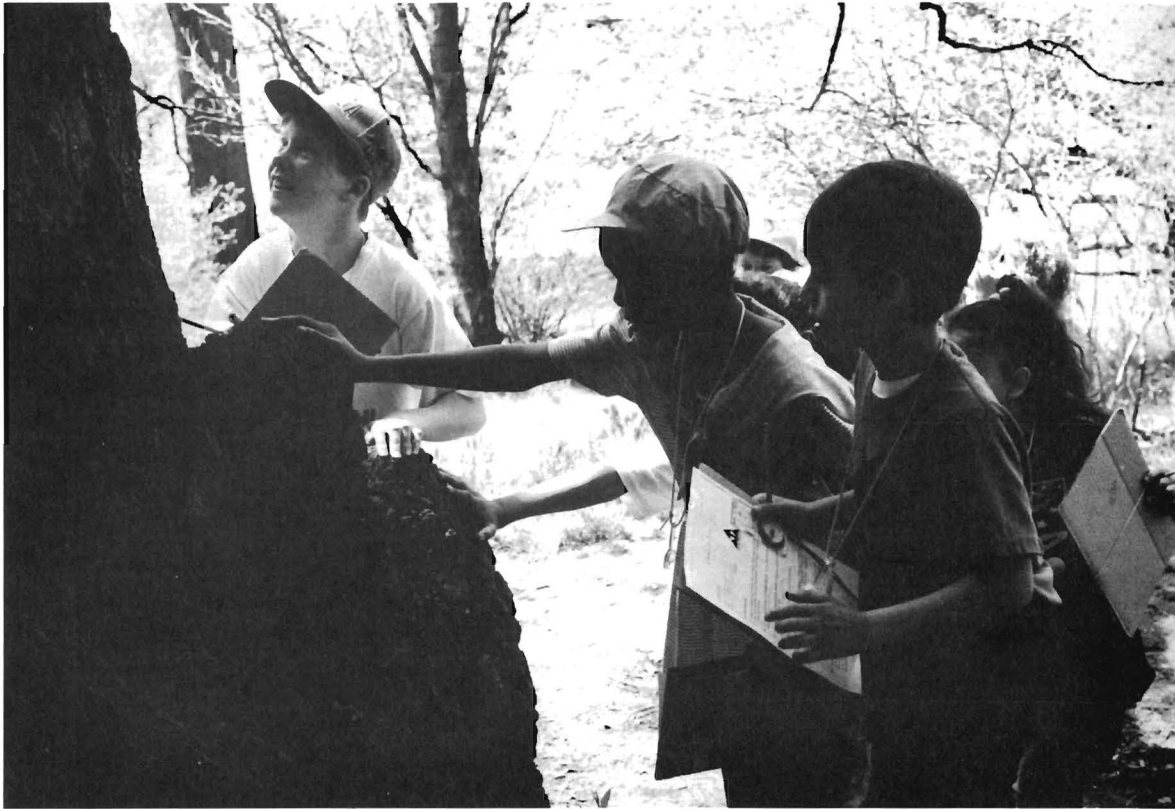
Membership and Adult Education

Only a small portion of our diverse audience support the Arboretum directly through membership, and the number of members has remained relatively constant for several years at about 3300. Approximately 500 new members joined last year. The major benefit of membership is the publication of 4 issues of *Arnoldia*, which last year contained 24 articles largely focused on the botany and horticulture of plants ranging from mistletoes to the chestnut and its blight. After 4 excellent years of service, Dr. Peter Del Tredici stepped down as editor in June to assume a new position as Assistant Director for Living Collections. He has been replaced by Karen Madsen.

Over the past half decade, the size of our adult education program has grown one-third larger each year, stretching our staff and space resources thin. We have therefore moved to stabilize the size of the program at a level appropriate to our facilities. This means we will offer a set of courses totalling 400-450 class meetings each year, which is approximately the size of the program in 1989-1990. In reducing the number of offerings, we have increased their quality and put greater emphasis on the mission of the Arboretum, namely the biology, cultivation, and conservation of temperate woody plants.

I also made an administrative decision to terminate the Arboretum's certificate program. It lacked the rigor ordinarily associated with other certificate programs at the University, and it could not really certify that its students had mastered a body of knowledge. Rather than establish examinations and formal tracking systems, I have decided to maintain the informal and inexpensive nature of our adult education courses that is greatly preferred by our students.

After seven years at the Arboretum, Nan Sinton resigned her position last April as manager of adult education to pursue business opportunities in garden design and horticulture. She has been replaced by Marcia Mitchell.



LEAP (LEarning About Plants)

Last year the Arboretum successfully raised funds to support our expanding program in children's science education. In addition to a successful Fall Appeal that brought in \$32,889 from 383 contributors (a 20% increase over the previous year), we secured grants from the General Cinema Corporation Charitable Foundation, Arthur D. Little, the Jessie B. Cox Charitable Trust, the Davis Educational Foundation, the Junior League of Boston, the Arnold Arboretum Committee, and the Massachusetts Cultural Council.

Our annual sequence of four Field Study Experiences brought 2713 elementary schoolchildren to the Arboretum between October and June, along with 158 teachers and 241 parents or teaching aides. Fifty-three percent of these students attended Boston public schools. As one teacher said following the "Around the World with Trees" field study: "It exemplifies the importance of field experiences and how much more learning seems to take place when

Boston schoolchildren recording botanical field notes as they search for the dove tree (*Davidia*) in the "Around the World with Trees" field study, part of the Arboretum's elementary science program. Photo by Diane Syverson.

children are wholeheartedly involved, when the materials and subjects come alive, and they solve problems together.”

The Arboretum also conducted a very successful teacher-training workshop in July centered around a K-through-6 life science curriculum called LEAP (LEarning About Plants.) It was developed with funds from NSF. Using a constructivist approach to learning in children, both the curriculum and the workshop focus on basic science concepts learned through direct interaction with the natural world. The greatest strength of the program is the continuing support we provide to teachers during the school year through group refresher meetings and direct visits by LEAP staff to the classroom.

In 1991 thirty-five teachers attended a five-day workshop. In 1992 we expanded the workshop to ten days for twenty-five participants and this greatly improved the quality of the training. Dr. George Hein of Lesley College provided a formal written evaluation of the program, and we will continue to seek local foundation and corporate support for future teacher-training workshops.

Historic Landscape Preservation

Our growing collaboration with the National Park Service (NPS) continued to flourish with the stationing of NPS interpretive rangers at the Arboretum last spring and fall to conduct tours on the historical design of the landscape. Over 340 visitors participated in 40 walks; 90 percent of these individuals had never been to the Arboretum before.

In 1992 the North Atlantic Regional Office of the NPS and the Frederick Law Olmsted National Historic Site in Brookline created the Olmsted Center for Landscape Preservation whose mission it is to provide technical assistance to NPS sites responsible for historic and cultural landscapes. The Arnold Arboretum is a partner in this Center and provides expert consultation on the taxonomy, propagation, and horticultural maintenance of historic plant materials in designed landscape settings. By December of this year Arboretum staff, through a contract with NPS, will complete a cultural landscape assessment of “Fairsted,” the Olmsted site in Brookline, and this will serve as a model for the type of technical assistance offered by the Olmsted Center.

In August we signed another amendment to our five-year cooperative agreement with the Service that will expand these assessments to seven

other historic sites in the region. Historic landscape preservation is a field of growing interest throughout the country among managers of historic buildings and cultural, vernacular, and natural landscapes. It represents a major area of future development at the Arboretum.

Planning

Much staff time was spent during the past year developing long-range plans in three areas: a comprehensive building renovation, a strategy for educational interpretation, and a landscape master plan. All will significantly influence public programs. The renovation plans will be discussed later in this report (see Administration).

The landscape plan, which is being created with the help of Sasaki Associates, Inc., will address three questions: (1) How can services to visitors be improved through the siting and development of a new visitor center at the Arboretum? (2) How can parcels of land adjacent to the Arboretum serve our mission in the future? (3) How can the Arboretum better manage its edges and entrances? The Sasaki study will be completed early in the new year.

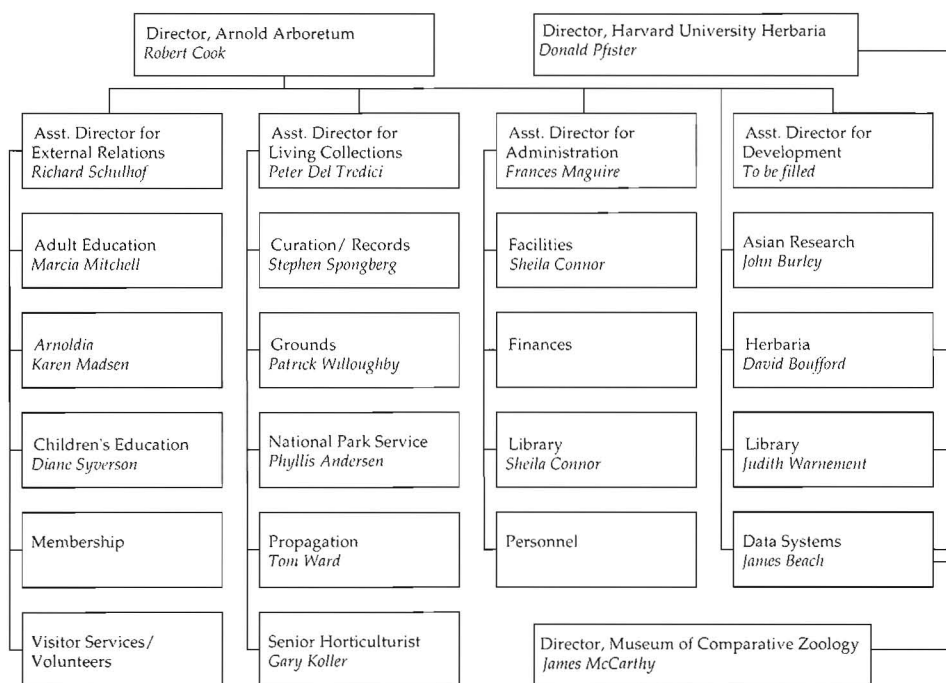
Following renovation of the Hunnewell Building this winter, we are planning to devote twelve-hundred square feet of exhibits that provide orientation and interpretation of the Arboretum collections and landscape for visitors. During the past year consultants from the American History Workshop have been working with our staff to develop a set of scientific and cultural themes linked to specific locations on the grounds. This work has been supported by a grant from the National Endowment for the Humanities. In the center of our exhibit space will be a large scale model of the Arboretum keyed to interpretive information, wall displays, and a video film. An interpretive specialist will provide additional guidance to visitors, and a portion of the space will serve as an information center providing materials and pamphlets relevant to our educational mission. We anticipate completion of this interpretive plan in the spring of 1993.

ADMINISTRATION

Since becoming director of the Arboretum in 1989, I have felt a growing dissatisfaction with our organizational structure. During my first year I altered reporting lines to permit operations in Cambridge to function independently from operations in Jamaica Plain, thereby having supervisors work where their

supervisees work. Over the past year I made additional decisions that have further defined our organizational structure in Jamaica Plain (see figure 1). Four assistant directors now report to the director. External Relations includes all of our educational outreach and service to members, casual visitors, and the community. Living Collections consolidates the department that maintains our landscape and woody plants. People, facilities, and money are managed under Administration. Finally, the new position of Assistant Director for Development will soon be filled.

Figure 1. Organizational Structure



In Cambridge I share administrative responsibility for herbarium and library collections with the director of the Harvard University Herbaria (HUH), Professor Don Pfister. He is appointed by the Dean of the Faculty of Arts and Sciences (FAS). Two positions, Assistant Director for Collections and Librarian, report to both myself and the HUH director. The position of Data Administrator, created last year, reports to both directors as well, and also to the director of the Museum of Comparative Zoology, Professor Jim McCarthy. Professorial positions in HUH fall under the administration of the Dean of FAS, Professor Jeremy Knowles. Finally, research positions

funded by grants to the Arnold Arboretum, such as those for our Indonesian program, are supervised solely by me. These diverse and split lines of authority in HUH give some measure of the complicated nature of the Arboretum's collaboration with FAS in Cambridge.

Renovation

The Hunnewell Building, currently serving as both our visitor and administrative center, was built in 1892. A large wing for Sargent's growing herbarium was added in 1906. Although the building's utility systems have been repaired or upgraded at one time or another, it was clear when I arrived in 1989 that a comprehensive renovation would be required to address a large number of code violations in order to bring the building into compliance. In particular, the floors of the herbarium wing were structurally unsound for the loads they were carrying, parts of the building contained ancient horsehair and asbestos plaster, and the valuable holdings of the library were deteriorating because we could not control the interior climate. The passage of the Americans with Disabilities Act in 1991 brought a host of new federal standards as well.

For the past year we have devoted many hours to the creation of architectural plans for a comprehensive renovation of the building. Working with George Oommen from Harvard's Planning Office and the Boston architectural firm The Primary Group, we completed planning last summer and closed the building to the public following Labor Day. In addition to removing all asbestos and structurally reinforcing the herbarium floors, the renovation will upgrade all utility systems to meet current code requirements. It will also improve security and fire safety, install climate control, refinish most surfaces, and replace all windows for improved energy conservation. To address problems of accessibility for the disabled, a new landscaped walkway will be created out of earth at the front entrance, and an elevator tower serving all floors will be constructed on the side of the building.

The project will cost \$3,250,000 to complete. Because of the severity of our current code violations, as well as the favorable construction climate in Boston, we have decided to borrow funds for this renovation now. Retiring this debt will be a major goal for our participation in Harvard University's upcoming capital campaign. We anticipate reopening the renovated building in the fall of 1993.

Figure 2. Summary of Operations

	FY 1990	FY 1991	FY 1992
INCOME			
Endowments	2,251,906	2,550,576	2,718,957
Membership/Gifts	317,546	496,731	431,312
Enterprise	270,211	312,827	318,483
Grants	416,298	404,229	535,230
Education/Publications	263,970	287,290	249,553
TOTAL INCOME	3,519,931	4,051,653	4,253,535
EXPENSES			
Salaries	1,827,431	2,110,151	2,255,426
Supplies/Equipment	550,794	724,071	665,530
Facilities/Operations	384,164	351,491	287,734
Services	351,079	620,723	627,539
Travel	43,511	71,122	73,581
TOTAL EXPENSES	3,156,979	3,877,558	3,909,810
EXCESSES			
Unrestricted Excess	112,044	36,482	81,719
Restricted Excess	250,909	137,612	262,004
TOTAL EXCESS	362,953	174,094	343,723
TOTAL FUND BALANCES	1,300,478	1,575,154	1,657,652

Finances

The Arboretum has completed this past fiscal year (July 1, 1991, to June 30) in very sound financial condition (see figure 2). Our income from endowment was less than anticipated, largely due to a three-percent drop in the income we receive from the Mercer Fund. This fund is not part of the endowment managed by Harvard University but is invested by independent trustees. Gift and membership income was less than 1991 because we received a large capital gift in the earlier year for construction of the Davison Rhododendron Path. Grant income rose significantly in the past year, largely due to funding for our teacher training and Southeast Asian initiatives.

Overall income increased by five percent, while the increase in expenses was kept to less than one percent, with significant savings in the basic costs of facilities. Services associated with grant-funded initiatives continue to be high. Although not shown in this table, we did draw down our Building

Reserve Fund by \$170,000 for the costs of renovation planning. Despite this expenditure and the decline in anticipated income from the Mercer Fund, we were still able to save over \$82,000, thus bringing our total fund balances to \$1,657,652.

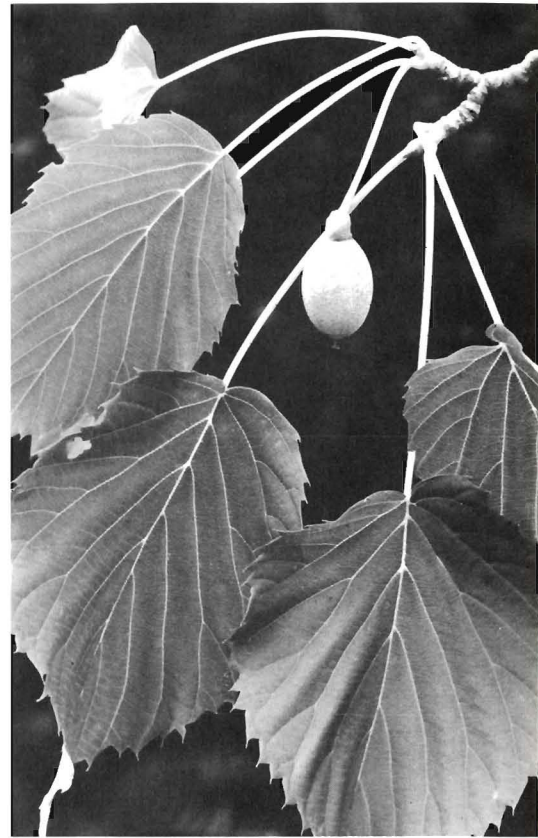
The Campaign

Although President Derek Bok, prior to his resignation in 1991, had approved the inclusion of the Arboretum in a university-wide fundraising campaign, I recognized that a new administration would want to review this decision in light of overall university priorities. Last year our new president, Neil Rudenstine, delegated responsibility for this review to Provost Jerry Green. In August I presented the case for the Arboretum's long-term financial needs to the administration.

Unlike most public botanic gardens and arboreta, the Arnold Arboretum does not receive income from either admission charges or local and state government. We are unlikely to ever receive significant income from commercial enterprises such as a restaurant or shop. Federal and foundation grants pay for the costs of new program initiatives but do not provide any income for basic operations. Therefore the Arboretum is primarily dependent upon income from past philanthropy (endowment) and upon gifts given for current uses.

Because endowment income does not keep pace with inflation, the continuing receipt of major gifts to endowment is critical to implementing the basic mission of the institution. With the reaffirmation of its trust obligations to the Arnold Arboretum in 1988, the University committed itself to sustaining this basic mission. Inclusion in a capital campaign is the most obvious and central means whereby this obligation is realized. In August the decision for Arboretum participation was finalized, and we have subsequently initiated planning to establish goals and timetables.

In preparation for last summer's review, I assembled a history of giving to the Arboretum taken from the financial reports of the University. Using the Consumer Price Index, which was first published in 1913, I created



The fruit of the dove tree (*Davidia involucreta*). It was the search for this tree that occasioned E. H. Wilson's first expedition to China, 1899–1902. Stephen A. Spongberg relates the story in his 1990 book, *A Reunion of Trees*.

Figure 3. Current Use Gifts

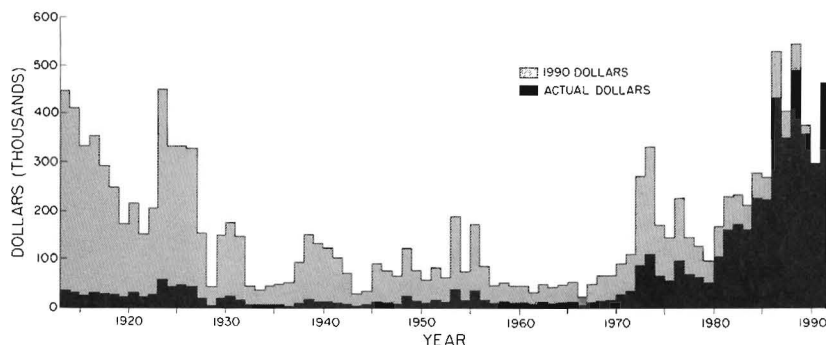
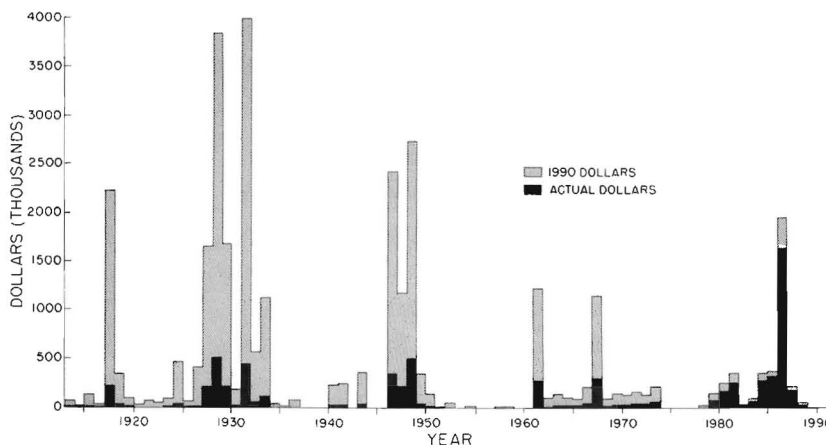


Figure 4. Capital Gifts



two charts that show both endowment gifts and gifts for current use in terms of actual dollar amounts and amounts converted to their value in 1990 dollars.

Current use gifts reveals the impressive ability of Professor Sargent to sustain the operations of the Arboretum through the annual generosity of a close circle of friends (see figure 3). In recent years, with a much broader base of membership, we have been able to return to Sargent's level of annual giving. However, in 1913 most of the costs of running a much smaller Arboretum were dependent upon current use gifts; such gifts represent only 10% of the operating budget today.

Major gifts to endowment display a much more unpredictable and periodic nature (see figure 4). The last capital campaign at the Arboretum followed the death of Charles Sargent in 1927 when a number of large contributions created most of the funds that presently sustain us. Subsequent capital gifts to endowment reflect bequests from only a few very generous individuals. I am confident that the coming campaign will see a return to the expression of commitment to the Arboretum evoked by the memory of Sargent.

We experienced an example of this kind of commitment last year that nicely returns us to the international theme of this report. F. Stanton Deland, Harvard Class of 1936 and a long-time friend of the Arboretum, bequeathed to us a very generous gift in 1987. Last year, after consultation with Mr. Deland's family, we established an endowment, the income from which will support the Deland Award to be given to an undergraduate or graduate student for research on the biology of woody plants.

Last summer we made the first Deland Award to Stuart Davies, a Ph.D. candidate working with former director Peter Ashton to investigate the comparative ecology of several important species of dipterocarp trees in the tropical forests of northern Borneo.

It is a special and rare kind of philanthropy that supports the mission of an institution committed to scholarship and service halfway around the world. It requires a vision of long-term investments that transcend immediate and local benefit. I know that the Deland Award would have deeply pleased Stan Deland. I suspect it reflects precisely the kind of vision and commitment that Charles Sargent hoped would sustain the international mission of the institution he created.



Robert E. Cook, Director

31 December 1992



Phellodendron pyriforme.
Photo by Rácz & Debreczy.

PUBLISHED WRITINGS OF THE ARNOLD ARBORETUM STAFF

J. H. ALEXANDER

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P. S. ASHTON

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J. H. BEACH

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K.-J. KIM

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J. V. LAFRANKIE

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J. WEN

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C. WOOD

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STAFF OF THE ARNOLD ARBORETUM*

ADMINISTRATION

Rose Balan, *Receptionist*
Donna Barrett, *Receptionist*
Vibeke Burley, *Secretary*
Linda Concino, *Administrative Assistant (left 2/7/92)*
Robert E. Cook, *Director, Arnold Professor*
Melanie Dunn, *Accounting Assistant (left 7/30/91)*
Frances Maguire, *Assistant Director for Administration (appointed 6/15/92)*
Patricia Marinick, *Receptionist*
James McGrath, *Properties Manager (left 7/29/91)*
Yu-Ling Wang, *Accounting Assistant (hired 7/15/91)*

HERBARIUM

David Boufford, *Assistant Director for Collections, HUH*
Michael Canoso, *Manager of Systematic Collections (retired 7/31/91)*
Susan Hardy Brown, *Herbarium Assistant*
Ida Hay, *Curatorial Associate*
Susan Kelley, *Staff Assistant*
Emily Wood, *Manager of Systematic Collections (appointed 9/1/91)*

LIBRARY

Sheila Connor, *Horticultural Research Archivist*
Kimberly Crandall, *Library Assistant*
Elzbieta Ekiert, *Library Assistant*
Benqing Gui, *Library Assistant (left 2/28/92)*
Karen Kane, *Library Assistant*
Judith Warnement, *Librarian*

LIVING COLLECTIONS

John Alexander, *Chief Plant Propagator*
Hollis Bedell, *Curatorial Associate (hired 9/23/91)*
Kenneth Clarke, *Custodian*
Luis Colon, *Grounds Staff*
Julie Coop, *Assistant Superintendent of Grounds*
Peter Del Tredici, *Assistant Director for Living Collections (appointed 5/1/92)*

Julane Fagnant, *Staff Assistant, Plant Records (hired 8/16/91)*
Robert Famiglietti, *Grounds Staff*
Donald Garrick, *Grounds Staff*
Michael Gormley, *Grounds Staff*
Dennis Harris, *Grounds Staff*
Karlton Holmes, *Grounds Staff (appointed 9/23/91)*
Gary Koller, *Senior Horticulturist*
David Moran, *Pruner*
Bruce Munch, *Grounds Staff*
Robert Nicholson, *Assistant Plant Propagator (left 12/21/91)*
James Nickerson, *Grounds Staff*
John Olmsted, *Head Pruner*
James Papargiris, *Grounds Staff*
Jennifer Quigley, *Curatorial Associate*
Maurice Sheehan, *Working Foreman*
Stephen Spongberg, *Horticultural Taxonomist*
Darryl Sullivan, *Apprentice (9/23/91–5/1/92)*
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Thomas Ward, *Greenhouse Manager and Propagator (appointed 5/1/92)*
Patrick Willoughby, *Superintendent of Grounds*

PUBLIC PROGRAMS

Diana Boehm, *Assistant Shop Manager*
Amy Wolff Cay, *Shop and Visitor Services Manager*
Jeanne Christianson, *Membership Coordinator (left 9/30/91)*
Julane Fagnant, *Staff Assistant, Education (hired 8/16/91)*
James Gorman, *Staff Assistant, Visitor Services (hired 5/1/92)*
Laurel Landers, *Education Associate (left 12/12/91)*
Marcia Mitchell, *Adult Education Manager (hired 6/16/92)*
Roberta Roy, *Children's Program Assistant (hired 9/23/91)*
Richard Schulhof, *Assistant Director for External Relations (appointed 3/15/92)*
David Sieks, *Staff Assistant, Membership*

[FN:]* 1 July 1991 through 30 June 1992

Nan Blake Sinton, *Director of Public Programs*
(left 4/15/92)

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Pamela Thompson, *Staff Assistant, Education*
(hired 8/5/91)

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Peter Ashton, *Charles Bullard Professor of*
Forestry

James Beach, *Manager of Biological Database*
Systems (hired 7/1/91)

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Alison Church, *Curatorial Assistant*

Michael Dirr, *Putnam Fellow* (left 9/15/91)

Bryan Dutton, *Research Editor*

James Jarvie, *Research Associate*

James LaFrankie, *Research Coordinator*

Andrew McDonald, *Research Associate* (hired
1/1/92)

Cheryl Murphy, *Administrative Assistant*
(hired 5/27/92)

Peter Stevens, *Professor of Biology*

Jun Wen, *Mercer and Putnam Fellow* (left 6/30/92)

RESEARCH AFFILIATES

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Michael O. Dillon (appointed 10/1/91)

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Shiu-Ying Hu Hsu, *emerita*

Elizabeth A. Kellogg

Bernice G. Schubert, *emerita*

Carroll E. Wood, Jr., *emeritus*



