In the extended introductory to my first annual report I laid out the basis for a future policy, firmly anchored in the wise precedents set by our founders, which can reconcile to mutual advantage our responsibilities in university research and instruction, and in public education and amenity. This year we have been principally concerned with planning and organization and a start has been made in a search for the necessary financial support. Readers will consequently notice several changes, and in particular, newcomers to our staff. I have been torn between writing a short summary of the year's achievements — a course advocated by some of my colleagues — and the rather detailed account which lies beyond you. I chose the latter in response to comments from some of our readers, and in the belief that many of you share a close personal interest in at least some aspects of our many endeavors.

This year past marked major progress at both Cambridge and Jamaica Plain. The new extension to the Harvard University Herbaria Building was opened on May 23rd, 1980, at a ceremony attended by President Derek Bok, Dean Richard Leahy, Professor Farish Jenkins, chairman of the Biology Department, and the directors of the Arnold

Opposite: A familiar view through the front entrance to the Administration Building of the Arnold Arboretum at Jamaica Plain. Photograph by S. Geary.
Policy was defined and of the present Dr. Richa Sheila Geary, assistant lit Hicks, curatorial assistant plan for the restoration of feasibility study was com three problems: the best n commensurate with their Olmsted's and Sargent's d the best means for their reality; and, briefly stated, w preted for the public (see sented to the Living Coll June 1980, the National S two years for the purpose tem. This involves acquir University Herbaria), devi computer storage, and vet and entering them into the for our living collections in of the American Horticult will continue, for the PSD access to the records of otl access for others to ours; computer would prove too

One hundred and eight living accessions are recor records that must be conin located for monitoring an revised since 1969. They a consequently have suffer ections that have followed Ol aration of a completely n scale, the boundaries of the established. A grant propo involve complete remappi creation of a simplified col sale, as well as a new set of the end of the fiscal year.

Under the direction of collections and chairman 1980 saw a marked further on the grounds. This was enthusiasm of the ground: Goodell, and to an except ceeded a good group in th
coupled with careful cultural practices appear to have effected a 15% reduction in oil consumption, though this is a conservative estimate in view of the cold and open winter. The cold storage facility has been repainted. The exposed steel superstructure of the headhouse and administration building, which after only two years was again badly affected by rust, has been cleaned and recoated with a new rust and weather resistant paint.

During the year the Southwest Corridor Project, which was discussed in my previous report, began reconstruction operations on the section of the line abutting our South Street tract. The line was removed and the embankment lowered from the Arboretum Road underpass northwards to the present Forest Hills Station. Gary Koller assisted John Frey, the landscape architect for the new station, in plant selection and worked with the Massachusetts Bay Transportation Authority architects in site planning for a projected land link between the new station and the arboretum through the South Street tract. Two further negotiations involving use of the tract are in process. The city's water department is searching for downstream sites in the Stony Brook drainage, where dams can be constructed for temporary impoundment of floodwater, to reduce the back-up of polluted water that occurs in the Back Bay Fens following heavy rain. Goldsmith Brook, which flows through the meadow between the Administration Building and the Arborway, and Bussey Brook, which flows from the arboretum through the South Street tract of the Arnold Arboretum, both drain into the Stony Brook. A dam has been suggested along the boundary between the South Street tract and adjacent city land, and this would lead to periodic short-term flooding of the wetlands that occupy the northern sector of the tract. Meanwhile, the Boston Police Department is considering building additional stables on the same city land. An alternative site for the stables, in and toward the southern end of our South Street tract could be advantageous as it would not, like the first, impede our projected access to the new Forest Hills station. It might encourage greater visitation of the arboretum by the mounted police as well.

Following the approval of a new accessions policy by the Living Collections Committee, which is in line with our plan for eventual restoration of the Sargent and Olmsted plan, additions have been placed on the grounds following the sequence in the original Bentham and Hooker botanical classification, wherever conditions have allowed.

Dr. Stephen Spongberg earlier listed 2500 potentially hardy woody plant taxa not currently represented in our collections. Our long-term objective will be to introduce these anew from the wild. We meanwhile aim to acquire propagants from genotypes already in cultivation, where possible of known provenance. Mr. Harold Hillier, whose nurseries in Hampshire, England, contain one of the most comprehensive collections of wild woody taxa in cultivation, and to which Arnold Arboretum collectors have contributed new material over
Improvements made at the Dana Greenhouse included the addition of air-cap insulation to glazed walls, while air-inflated co-polymer film covering was installed over roof areas. The result was a 15% reduction in fuel consumption. Photograph by P. Del Tredici.

many years, has generously agreed to make available to us propagating material from his own arboretum. We take note of this example of the mutually beneficial collaboration that we continue to enjoy with the nursery trade. I will allude to others later in this report.

Several major additions to — and relocations of — individual collections have already been started. Dr. Richard Weaver, who is now proceeding with detailed plans for the restoration of individual collections, together with Mr. James Burrows personally laid out the position of each plant, oversaw and assisted with planting. Mr. Gary Koller, who has supervised all operations, has concentrated on reviewing, and, where necessary, organizing remedial action on collections in special need of horticultural attention or repropagation.

During the summer and fall of 1979, a total of 465 plants was added to the living collections in Jamaica Plain. These plants were from 114 different accessions representing 86 botanical taxa and 14 cultivars; several taxa were planted in large masses. Examples are 18 plants of dwarf Rhododendron dauricum (1 wild accession), 18 plants of Elliottia paniculata (3 accessions), 13 plants of Kalmia latifolia (4 accessions), all at the base of Hemlock Hill; and 21 plants of Rhododendron chapmanii (2 accessions), behind the rockery. During the spring of 1980, a total of 523 plants was added to the living collections in Jamaica Plain. These plants were from 285 separate
accessions representing 251 botanical taxa and 5 cultivars. All of the cultivars were planted in the new beds below the dwarf conifer collection. In general, the shrubby plants were planted in well-prepared beds. These beds may not look natural at present, but the bed preparation greatly facilitated the planting and should increase the plants' chances of survival. It is intended that the beds will eventually take on the appearance of a mass planting.

Approximately half of the existing *Philadelphus* collection was propagated in 1976 and the successful propagants, exclusive of cultivars, were planted this spring. A total of 85 individuals representing 34 accessions of 16 taxa were planted out. A few of the best remaining specimens will be maintained in their present location, the proper place in the Bentham and Hooker sequence, but so as not to clutter the area under the tree legumes, the bulk of the collection has been relocated along the path leading to the 383 South Street entrance. In order to connect the old and new collections, several groups were placed at the top of the lilac bank along Catalpa Path. All propagants of original Lemoine cultivars, as well as those of a few other cultivars cited in S. Y. Hu's monograph of the genus, were planted at the Case Estates. All plants of other cultivars were distributed.

A collection of putatively hardy bamboos, mostly *Phyllostachys* species, was selected this winter from the United States Department of Agriculture Plant Introduction Station in Savannah, Georgia, where their extensive collection is being closed down. The plants were collected on a trip to Georgia sponsored jointly with the Boston Zoological Society and the New Alchemy Institute, Woods Hole, Massachusetts. A total of 33 individuals representing 19 accessions of 17 taxa was planted out this spring. A few of these, mostly the low-growing and reliably hardy species, were planted in the present bamboo collection behind the *Aesculus* collection. A few were planted in their proper position following the Bentham and Hooker sequence in the old dwarf conifer collection. The remainder, because of their doubtful cold hardiness, were planted in protected areas elsewhere on the grounds.

Restoration of the following collections to their proper position in the Bentham and Hooker sequence was begun with the fall, 1979, and spring, 1980 plantings: Ranunculaceae, with species of *Clematis* on the parking lot fence; Guttiferae and Theaceae, with species of *Hypericum* and *Stewartia* in the azalea border; Berberidaceae, with species of *Berberis* just beyond the *Liriodendron* collection; Staphyleaceae, with species of *Staphylea* as understory shrubs in the *Acer* collection; Celastraceae, with species of *Euonymus* along the woods at the edge of the *Aesculus* collection; Vitaceae, with species of *Vitis* and *Ampelopsis* on the Arborway wall in the *Acer* collection; Hamamelidaceae and Araliaceae, with species of *Corylopsis* and *Fothergilla*, and *Aralia* and *Acanthopanax* around the middle pond; Rosaceae, with species of *Spiraea*, *Holodiscus*, *Aronia*, *Photinia*, *Amelanchier*, *Neillia*, *Aruncus*, *Prunus* and *Pyrus* around the first
pond, the area of the shrub collection, and the Forest Hills bank; Scrophulariaceae, with Paulownia along Catalpa Path (these are the first plants resulting from the Japan-Korea trip to be planted on the grounds); Verbenaceae, with Vitex, and Loganiaceae, with Buddleia along the walk through the tree legume collections; Saxifragaceae, with species of Deutzia and Ribes along the woods behind the tree legumes; Caprifoliaceae, with species of Viburnum, Lonicera, Weigela and Sambucus connecting the remnants of the collection on the tree legume slope with the present Viburnum collection by 1090 Centre Street, and the traditional Lonicera collection along Linden Path; and Ericaceae, with species of Kalmia, Rhododendron, Vaccinium and Elliottia along the base of Hemlock Hill and on the hill itself.

The orchard-like planting scheme of the Malus and Crataegus collections are incongruous in our collections. During September, 1979, many Malus were diseased and partially defoliated; those that were found to be at least 70% defoliated and regarded in the literature to be disease susceptible were removed. In addition, 30 "species" of Crataegus and 22 species and varieties of Malus were planted in a different arrangement. The former were planted in small groves on Peter's Hill, with closely related "species" together. They were usually planted in close proximity to an existing tall tree to offset the low spreading effect of the individual Crataegus plants. The Malus were also planted on Peter's Hill but scattered along the edge of the woods on top of the hill.

Dr. J. B. Phipps, of the University of Western Ontario, has offered to verify the identities of the Crataegus in our collection. We have started a herbarium collection program from our holdings for this purpose and members of the New England Rose Society, notably Mr. Malcolm Lowe, have kindly agreed to verify our holdings in the genus Rosa at Jamaica Plain and Weston. The collection has been in serious decline, but with their advice and assistance the level and quality of maintenance will be improved, and species accessions are being re-propagated. The society had donated new plants for our collection, and we have provided propagating materials for their use.

Dutch elm disease has affected 18 elms in the collection this last year. Twig samples were collected for pathological analysis; a consulting plant pathologist reviewed the trees and made recommendations. To conserve genotypes, cuttings have been taken from the most significant accessions and remain healthy. Pine needle blight (Diplodia pinea) has affected several plants in the conifer collection and appears to be spreading. As a result, we have initiated periodic applications of fungicidal sprays and fertilizer. The spread of the disease seems to have been retarded. The Corylus collection was reviewed taxonomically and plants of questionable identity were removed. The remaining plants are suffering from an unidentified fungal root infection and are to be repropagated for replacement.

Areas of the arboretum that were neglected and had become over-
grown have been reviewed. Improvements were begun in the Berberis and Viburnum border near Centre Street gate, the Centre Street beds, the Taxus border along Bussey Street and at the base of Hemlock Hill, and the dwarf conifer collection. Gary Koller put major effort into relabeling and repopulating the existing Populus collections, which are deteriorating, and spent several days reviewing, evaluating, and relabelling the Alnus collection.

Among the more outstanding plants lost during the year were a large linden, Tilia petiolaris (4968), broken in a storm; an Acer saccharinum (1256A) which was removed after several years of decline; Corylus avellana cv. Contorta (4845), Pinus bungeana (1404-5) and Kalopanax pictus (12456) from unknown causes; Laburnum cv. Watereri (187-41-a) which had been hit earlier by a stolen car, was destroyed in a storm; and Sorbus alnifolia (3626-A) which had declined with fire blight.

In view of the remarkable comprehensiveness of the records of our living collections, it has been regrettable that the history recorded in their growth rings has not been retained when plants have been removed. The Center for Wood Anatomy Research at the U.S.D.A. Forest Products Laboratory, Madison, Wisconsin has agreed in the future to accept and store such samples for anatomical, dendrochronological and other research. These will consist of 3 inch wide, 1 inch deep sections from bark to core, taken from the butt of the largest basal stem along a representative radius.

I alluded last year to the report written by the Kew botanist W. J. Bean following his visit to the Arnold Arboretum in 1909, when he noted that the native field flora was in those days allowed to grow and flower beneath the trees. In due course the trees shaded out much of this flora. During the 1930's labor shortages made it increasingly difficult to manage this rank vegetation, and after the neglect of the war years, a policy of more frequent mowing led to its replacement by the ubiquitous grasses that came from northern Europe with the early settlers. The arboretum's carefully planned path system, defined on gentle topography merely by close scything along the trails, thus disappeared. It is our intention to reintroduce natural herbaceous flora in selected areas and simultaneously to regrade and redefine the original paths, thus encouraging more general use of the arboretum by the public. We believe that this may in turn ameliorate our security problem. The overall plan is included in a feasibility study completed in 1979.

Thanks to the generosity of an anonymous benefactor, we have been enabled to proceed with restoration of Oak Path, and to begin to introduce an interpretative oak woodland wild garden along part of its length. Dr. Weaver describes his plan in an article that follows this report. The grounds crew has already begun regrading and contouring

Restoration of the original path system is one important project requiring public support. Work on Oak Path has already begun, but restoration of Willow Path, pictured here, will require additional funding. Photographs by R. Weaver, Jr.
the path. Several masses of plants, including a mass of *Rhododendron chapmanii* (21 plants) behind the Rockery and four masses of *Cimicifuga racemosa* have already been put in place. These latter masses are made up of twenty plants apiece, and they will all be added to as more plants become available. This restoration will serve as a prototype for the others we hope to implement if public support can be obtained.

Acquisition of wild plants has begun for herbaceous plantings along several paths. *Dalibarda repens* and *Dryopteris phegopteris* are being propagated for use as ground covers on Hemlock Hill, where a northern coniferous forest and a mountain summit wild garden are envisaged. To see how plants would fare here, with respect to both the elements and vandals, two species of *Vaccinium* with two dwarf *Betula* species were planted on the rocky ledge at the very top of the hill. One plant has disappeared, but the remainder are doing well. Other plants, notably a mass of *Rhododendron fortunei* hybrids and also small shade-tolerant *Acer* species, were planted lower on the hill. Limited herbaceous plantings including masses of *Cimifuga racemosa*, *Trillium grandiflorum*, and patches of *Tiarella cordifolia*, *Phlox stolonifera*, and *Omphalodes verna*, have begun in the Leitneria Swamp at the end of Linden Path. Plants of the last three species were donated by Mrs. Sheila Magullion.

Several short collecting expeditions by staff were made within North America during the year. Richard Weaver and James Nickerson, head pruner, visited North Carolina for two weeks in September, 1979, returning with 108 collections from wild sources. Besides woody plants, a number of herbs were also collected. During December, 1979, 34 taxa, of which 30 were of wild origin, were obtained by Gary Koller and Jack Alexander in southern Missouri following a meeting they attended at the Missouri Botanical Garden. Robert Nicholson, greenhouse technician, sustained his reputation as a plant hunter by completing four trips. Three were in Vermont in connection with his project on sugar maple. The fourth, to the mountains of California, aimed to collect genotypes of tender species from their limits of cold hardiness, yielding 35 collections from six localities; of greatest potential interest were *Sequoiadendron giganteum*, *Leucothoe davisiæ*, *Arbutus menziesii* and *Lithocarpus densiflorus*.

The propagator, Jack Alexander, this year received 160 shipments for propagation, consisting of 839 taxa from 23 countries, including material collected by staff. Three hundred and sixteen taxa were propagated from our own accessions, to replace deteriorating specimens or to increase numbers pending collection from new wild prov- enances.

Acquisition of materials for propagation, in general, has been carried on in the routine manner. However, almost without exception, no seeds were ordered from *Indices Seminum* unless they had been collected in the wild. A generous gift from Forest Farm in Williams, Oregon, has added wild collected plants of 18 species to our collec-
Fruits of Magnolia virginiana, and cones of Tsuga canadensis and Sequoiadendron gigantea, drying prior to propagation at the Dana Greenhouse. Photograph by C. Lobig.

ations. These plants are all native to the western United States, and all are new to our collections.

Two hundred shipments, comprising 783 taxa were distributed to cooperating institutions, nurseries, and individuals in 15 countries. A further 723 were propagated to fulfill special requests; excess material resulting from these was also distributed.

Ms. Jennifer Hicks, curatorial assistant for mapping and labeling, accomplished much during the year. Her painstaking review of the living collections record system, and her planning for its rationalization, verification, and computerization have been referred to already. She was able to redraw four of the collection master maps and to complete rechecking of a further seven. Also, the existing master maps have been photoreduced to half scale and cleaned up for reproduction as new map books for use on the grounds.

James A. Burrows was appointed assistant supervisor of the living collections, in charge of the Case Estates, on July 9th, 1979. He concentrated during his first year on reviewing and reorganizing the nurseries, which were in a state of relative neglect, and on integrating this program closely with the planting and propagation programs at Jamaica Plain. This is a vital preliminary to the anticipated future increase in accessions.

The nurseries at the Case Estates comprise both temporary and permanent beds. The temporary ones containing plants that are grown until big enough to be planted out in the arboretum, received first priority. An inventory of the holdings was completed, followed by a review of records in order to identify plants that fail to comply with our current accessions policy. Plants that meet present criteria are to be moved to the arboretum as soon as possible, while the remainder will be distributed to the Friends and to other institutions. In future, the nursery area is to be planted on a rotation basis to improve operational efficiency and allow more easy control of soil fertility.

Because of the current serious shortage of outside space for young plants in the saran house at Jamaica Plain, occasioned by the recent increase in accession rate, a saran house was re-established inside the old ericaceous nursery area at the Case Estates; here the plants will be
protected from wind by the tall enclosing coniferous hedge. This new area, which is already nearly full, has also facilitated integration of operations at the two nursery locations. Half of the plants will be ready for transplanting out into the temporary beds in spring 1981.

Because of the increasing demand for nursery space, a new nursery area will be prepared in the coming year, replacing the now derelict pruning demonstration plot. The existing nursery beds are arranged by a number series as indicated on the map. Most of the plants formerly on the terraces (rows 1–40 and the 100's), have been transplanted to the arboretum during the year, leaving 80% of the area for planting up in spring 1981. The 300 rows next to the saran house contain mainly rhododendron cultivars. These have been checked for flower color and flowering time and will be transplanted by fall, 1980, leaving the area available for extension of the saran. The 400 rows contain evergreens; an inventory and planting list is currently being prepared prior to transplanting of material from 80% of the area in fall 1980. The 900 rows were replanted in the fall of 1979 with larger plants whose transfer from Jamaica Plain had been delayed; they should be ready to return to the arboretum in 1982. Finally, the 950 rows were totally renovated by soil improvement and fumigation; half the rows were planted out with material from Jamaica Plain in spring, 1980, and the rest will be filled in the fall. Harvesting of these is anticipated between 1984 and 1986.

As stated in my last report, the permanent nurseries were set out as a collection, partially transferred from the arboretum itself, of taxa considered not to be of ornamental value. In line with our present accessions policy, a complete inventory is being made, and collections worthy of replanting in the arboretum identified. Major collections of Berberis, Philadelphus, and Rosa in particular were found. As an emergency measure more intensive maintenance of these nurseries has begun this summer, and plants in imminent danger repotted. The complete propagation or transfer of the valuable accessions will take 5–6 years.

Now that urgent renovations are in hand Mr. Burrows, in collaboration with Mr. Koller and the manager of buildings and public services, Ms. Wendy Marks, will critically review our operations at the Case Estates, to prepare a financially viable plan for their future use.

The perennial garden, designed for Marian Case by John Wister, had fallen into disarray with many of its woody plants having outgrown the original design. With Mr. Wister's approval we plan to simplify the design, obviating the need for major and expensive changes in the plantings. This work should be completed by summer, 1981. The garden will then be an interpretive collection of native American perennial herbs with the more noteworthy cultivars that have been derived from them. Seeds of 75 plants, either native American species or cultivars of these, were received from the Park Seed Co.; most have been planted in the cold frames at the Case Estates. A total of 140 plants, mostly cultivars of native American species, was
Making room for new accessions involved major transplanting of existing nursery stock from the Case Estates in Weston to the living collections at Jamaica Plain. Tom Kinahan (above) and Dennis Harris (below) work at moving Crataegus and Ulmus from the grounds at Weston. Photographs by J. Burrows.
also purchased and planted in the Case Estates nurseries. We are pleased to have the collaboration of the Weston Garden Club in this project, which has volunteered to assist with its development and future maintenance. One noticeable improvement was made rather quickly. The tall, dry fieldstone wall, erected sixty years ago to support espaliered fruit trees was obscured by a vine trellis. This has now been removed.

A site for the Rhododendron display garden which is being planned jointly with the Massachusetts Chapter of the American Rhododendron Society has been chosen in the woods behind the tall stone wall. Clearing was started during the winter, and some weed control undertaken early this summer. It is hoped that the chapter will begin planting shortly. Meanwhile the American Iris Society, which will hold its 1983 convention in Boston, has requested the use of part of the field in front of the stone wall for the temporary display of 4000 iris cultivars.

At the end of 1980 the Arnold Arboretum will complete its term as cultivar registration authority for those genera of cultivated woody plants that lack authorities, under the auspices of the American Association of Botanic Gardens and Arboreta; thereafter the U.S. National Arboretum will act on behalf of the Association. Dr. Stephen Spongberg has continued meanwhile to act as registrar for these, as well as those genera for which the Arboretum continues to serve as International Registration Authority.2

The living collections of the Arnold Arboretum are increasingly being used for research. Taxonomist Dr. Stephen Spongberg has continued to use the collections for his own work. Bullard Fellow Dr. Amar Hans pursued studies on the pollination biology of Ulmus. Ph.D. candidate Michael Donoghue continues his fruitful research on Viburnum. His studies of growth problems in the living collections have furthered understanding of infrageneric relationships and have led to his being awarded the Cooley Prize by the American Society of Plant Taxonomists. Similarly, Paul Groff's senior thesis, completed during the year under Dr. Stevens' supervision, used our collections to throw light on generic limits in Ericaceae tribe Phyllodoceae. Graduate student Steven Rogstad is making studies of the growth and branching pattern of Asimina, Annonaceae, preliminary to studies in the tropical annonaceous genus Polyalthia. Professor Solbrig's students continue to use space in our greenhouses for their bio-systematic research into Viola. Among several scientists from other institutions to use our collections, Dr. Lester Nichols, Plant Pathologist at Pennsylvania State University conducted his eighteenth annual disease survey of our Malus collection; Dr. Frank Santamour, research geneticist at the National Arboretum, gathered specimens of various Acer species for chemical analysis; and Dr. Harold Pellett, University of Minnesota, 2 Those are Chaenomeles, Cornus, Fagus, Forsythia, Gleditsia, Lantana, Malus (ornamental varieties only), Philadelphus, Pieris, Ulmus and Weigela.
conducted controlled tissue-hardiness tests utilizing specimens supplied by the arboretum.

It will be recalled by readers of my last report that supervisory staff are being encouraged to develop their own research or to participate in the work of others, as far as time allows. Projects undertaken this year include the initiation of a program to breed mildew-free Syringa by Jack Alexander; a morphogenetic study of branching in Tsuga canadensis f. pendula by Peter del Tredici, and hybridization experiments in Hamamelidaceae and studies of sugar maple by Robert Nicholson.

The Royal Horticultural Society this year honored the Arnold Arboretum by awarding it the Reginald Corey Memorial Cup for the Magnolia cultivar ‘Merrill,’ a hybrid that had been developed by former director Karl Sax and named in honor of his predecessor, E. D. Merrill.

Members of the living collections staff have made extensive and appreciated contributions to our Friends and Public Service programs, propagating thousands of cuttings and seeds as gifts, giving lectures and tours for private groups. In addition to attending professional meetings, they prepared and erected our prize-winning exhibit at the spring flower show of the Massachusetts Horticultural Society, and assisted numerous students, nurserymen, horticulturists, botanists, and landscape architects by telephone and by letter.

Three staff members at Jamaica Plain left during the year. Eileen Twohig had worked as custodian of the Administration Building for 22 years. Of tireless energy and cast-iron reliability, Eileen brightened our lives with her good humor and her honest no-nonsense frankness. She retired in glory on May 31st, 1980, following a rousing party in her honor. We will miss both her and her husband Joe who so frequently volunteered to help out when something special was in preparation. We welcome Ms. Kathy Newman as our new custodian.

Constance Derderian, who has been honorary curator for our historic bonsai collection for many years retired for family reasons; we will be hard put to find a replacement with comparable skill and devotion. We are glad, though, that Connie is offering her popular course again in our fall 1980 program.

Mildred Pelkus, who had been accounts clerk at Jamaica Plain for 14 years, retired at the end of December, 1979. Her place was taken by Anne Johnson, who had joined the staff in October. Horticultural secretary Jeanne Sattely, resigned in January after a short stay, and has been replaced by Margaret Quinn. The reappointment of James Burrows has already been reported. Patrick Willoughby filled the vacant post of assistant superintendent in March, and James Papargiris filled a vacancy on the grounds staff.

A special tribute should be paid to the 14 summer horticultural trainees of 1980. Carefully selected from over 70 applicants, they came from nine states and most were college students in plant sciences. Five started early in the growing season, the others arriving as
An exceptional group of summer horticultural trainees were selected from applicants from 9 states. Posing in the branches of a cork tree (Phellodendron amurense) from left to right, standing — Imogene Villeneuve, Mike Eliot, 1st. row, seated — Mark O'Connor, Beth Robertson, Debbie Cahill, Greg Waters; 2nd row, seated — Kelly Kearns, Carol Hipple, Ed Bemis, Bob Turecek, Steve Winterfeldt, Michael Koralewski, Laura Durr. Photograph by H. Wise.

usual at the beginning of June. Careful attention to supervision and organization, and a stimulating program of talks contributed to a high morale. They have done a superb job.

THE HERBARIUM

Dr. Norton G. Miller's appointment as supervisor of the Gray and Arnold Arboretum Herbaria and chairman of the Herbarium Committee, a position he held for the past five and one-half years, ended as the fiscal year closed. Associate Professor Peter F. Stevens will assume both responsibilities. Dr. Miller will continue on the staff as botanist, Arnold Arboretum and Gray Herbarium.

The following curatorial accomplishments were made during the past year: An identification list for R. Barneby's monograph of Dalea (Leguminosae) was compiled. This was used as a basis for annotations of 1000 sheets in the combined herbaria. T. C. Whitmore's revision of Macaranga (Kew Bull., 1980) was used as a source for annotations of 600 sheets of this genus in our collection. Using the identification list of Ding Hou (Flora Malesiana, 1980) 1200 sheets of western Malaysian Anacardiaceae were annotated. Part of our holdings of the same family from Papausia and the Philippines has also been annotated. The Merrill collection of rubbings and fragments (Anacardiaceae only) has been mounted, annotated, and inserted into the general and type collections. Numerous annotations of specimens
in the Amaranthaceae (especially cultivated species) were added. Annotations of 759 species of Neotropical Rubiaceae, tribe Psychotrieae were completed. Materials representing 40 genera new to the herbaria were added during the year. Type folders were replaced in families 92 to 125. Geographical tags for the four New World regions were added to folders of families 105 to 127. There has been no insertion in the herbarium in Cambridge since preparations for the herbarium move have already begun.

The National Science Foundation this year awarded a further curatorial grant to the combined herbaria which will enable us to continue to curate families recently monographed, to search for unrecognized types, and otherwise to bring the collections to a condition of better annotation. In combination with the grant to be awarded for curation of the living collection records, the current grant provides for acquisition of a small computer in which the records of our type collection are to be stored.

An inventory of the herbarium and storage at Jamaica Plain, preliminary to a proposed renovation of the Administration Building was made in autumn, 1979. Volunteers under the supervision of Ida H. Burch are working on a project to collect specimens of the arboretum living accessions that are of documented wild origin in eastern Asia. Ten sets are being collected, and the duplicates will be used for exchange; collections number 214 so far. The group, headed by Cora Warren, includes Susan Davis, and Mary Wolcott, as well as staff member Kristin Clausen.

By the end of the fiscal year there were 1,102,306 sheets in the arboretum's herbarium at Cambridge. During the year, 10,357 sheets were mounted, 75 added directly, 12 removed. In Jamaica Plain there were eventually 168,048 sheets in the herbarium of cultivated plants, 810 being added during the year. Thirty-one sheets were repaired in the two herbaria. Of the accessions, 4827 were received by exchange, 392 as gifts, 447 by subsidy, and 721 for identification by staff. This year the major provenance was South America (1250 sheets), followed by East Asia (981), India (963) and Western Malesia (657), Europe (626) and Papausia (603). Staff made 1187 collections. During the year, 147 sheets were sent on exchange, 30 orchid collections were placed on indefinite loan in the Oakes Ames Orchid Herbarium; 1187 specimens were received on loan for staff members of the combined herbaria, and a further 4676 for students; 7969 sheets, received on loan for staff members in previous years were returned, and 3112 likewise for students. The combined herbaria sent out 30,463 specimens for study at other institutions, and received back 14,647.

The extension to the Harvard University Herbaria Building was completed during the year, although the air-conditioning continued to malfunction as it had done off and on through the two years during which alterations were being made. The paired compactor banks in each of the twelve new compactor rooms have been installed, and apart from the absence of gaskets, locking mechanisms, and a thor-
ough cleaning, they are ready to receive the mounted sheets. A major effort was made to finalize plans for the transfer of specimens to the new compactor space and rearrangement in cabinets in the original building. The basement curatorial area was completely reorganized and new metal cabinets from elsewhere in the building were put in place of the old tin-covered storage cases, which were in large part discarded. When the herbarium move is completed, there will at last be adequate storage for specimens awaiting processing or insertion, although the mounting materials storage room was reduced to half its original size during construction alterations. Ultimately, it will be necessary to make an accommodation for new storage space for our inventory of large-volume mounting and packaging supplies.

A number of staff changes should be noted. Rita Silverman, herbarium secretary, left during the autumn and was replaced on a temporary, part-time basis by Anita Fahey who worked nearly to the end of the fiscal year; Colleen Sliney was hired on 18 June, 1980, as the herbarium secretary. Olga Peixoto, part-time mounter, resigned in the autumn just before the birth of a child; no replacement was sought. Laurie Feine Dudley was hired as a curatorial assistant to replace R. James Hickey, who resigned to undertake graduate studies in botany at the University of Connecticut. Sarah Mellen, curatorial assistant, resigned and was replaced by Patricia Adakonis.

The present curatorial staff of the Combined Herbaria consists of M. A. Canoso, manager of systematic collections; Walter Kittredge, senior curatorial assistant; Laurie Feine-Dudley, curatorial assistant, Patricia Adakonis, curatorial assistant and Zepur Elmayan and Edith Hollender, mounters. Ida Hay Burch serves as curatorial assistant in the herbarium at Jamaica Plain; Anne Sholes and Helen Fleming are herbarium preparators there.

THE LIBRARIES AND ARCHIVES

The total number of volumes and pamphlets at the end of the fiscal year was 87,565: 172 added at Cambridge and 96 at Jamaica Plain by cataloguing, and 170 and 106 respectively by binding. In addition, 110 reprints were catalogued. Four hundred twenty journals are currently received at Cambridge, 223 at Jamaica Plain; 7 represent new subscriptions. Fifteen microfiches were added at Jamaica Plain; we now have 10,867 microfiches and 179 microfilm reels, acquired jointly with the Gray Herbarium; and 20,095 other non-book collections.

Eighty-eight of the volumes added this year were gifts; we acknowledge with thanks the donation of books by Mr. A. I. Baranov, Mr. Norton Batkin, Mr. Charles Boewe, Mr. Paul A. Cox, Dr. Otto Degener, Dr. Peter S. Green, Mrs. John D. Houghton, Dr. Richard A. Howard, Dr. S. Y. Hu, the Korean Ginseng Research Institute, Dr. Elbert Little, Mr. C. R. Long, Dr. Michael Madison, Dr. Ernest Mayr, Dr. and Mrs. Norton G. Miller, Dr. J. K. Morton, Dr. Lily M. Perry, Dr.
L. S. Plotnikova, Mr. Calvin Sperling, Dr. Stephen A. Spongberg, Dr. Peter F. Stevens, Mrs. Edward J. Thompson and Dr. Carroll E. Wood.

The completion of the addition to the Herbaria Building in Cambridge has alleviated space problems in the library. Cambridge staff started reorganization of the library when the new space became available for occupancy in August, 1979. To create a more efficient work area for library staff, a wall between two of the three library offices was removed and the new space was reorganized to provide separate work space according to functions. Shelving for periodicals in various stages of preparation for the bindery was installed. Three tables were arranged to provide a large work surface for processing material for the stacks. The new work area for staff is proving to be an efficient and satisfactory arrangement. Storage space, however, remains a problem.

The library privileges policy, which provides only limited access to the Harvard University Herbaria library for outside users and requires payment of a user fee, has been in effect for 15 months. Whether the policy has had an effect on screening visitors is hard to measure because of the unusual circumstances of the past year. The three weeks during which the library was closed for construction and the ongoing addition to the herbarium for most of the academic year may have discouraged outsiders from visiting the library. Two hundred twenty visitors did register however — an increase of 43 over last year. Coordination with the herbarium office when visitors from other institutions register to work in the herbarium has also helped to monitor visitor use.

A continuing project of removing pamphlet material from highly acidic covers and rebinding in cloth will ensure that the material will be in good condition for hundreds of years to come. William Prince's *Short Treatise on Horticulture* (1828) was in deteriorating condition and has now been disbound, the paper deacidified, resewn and rebound, preserving the original covers. The National Science Foundation's curatorial grant supported the rebinding and repair of Gilliam, *Travels over the Table Lands and Cordilleras of Mexico* (1846), and Browne, *Civil and Natural History of Jamaica* (1756). The University has received a third grant for microfilming rare or deteriorating library material under the Strengthening Research Libraries Program provided by Title II-C of the Higher Education Act. The Arnold Arboretum is continuing to submit titles for microfilming under this program.

At Jamaica Plain, space has not been so much a problem as the arrangement of the collection in it. At present, the collection is divided between first and third floors of the Administration Building. Sheila Geary, assistant librarian there, made an inventory of existing shelf space and of files, documents and archival materials. From this she derived a projection of future library space needs, as part of a preliminary plan for the reorganization of the interior of the building that she assembled in collaboration with Ida Hay Burch, and Eugenia Frey, public information and education coordinator.
Volunteers of the library over the past year made an important contribution to the operation. Approximately 110 hours were spent on various library tasks. Lou Segal and Al Thompson continued their work on treatment of leather bindings. Other work was performed by Amy Linssen, Gertrude Cronk and Helen Pino. Horticultural intern Ed Bemis also assisted in the library. With the help of volunteers Linda Bowman and Richard Warren, the contents and indices of C. S. Sargent's publication *Garden and Forest* have been photocopied and will be bound. The contents of this journal are valuable, as they reflect the state of botany and horticulture during the formative years of our institution.

Much work was done on the important negative and slide collections at Jamaica Plain. Volunteers Barbara O'Connor, Marie Dempsey, and Mary Ashton, under the expert direction of Dodie Loomis, spent 214 hours on the curation and maintenance of our extensive slide collection. Sheila Geary reorganized the section of the collection that depicts general views of the arboretum, following the Bentham and Hooker botanical classification by which the living collections themselves are ordered. Special topics are now grouped by subject at the end of the sequence. In addition, Sheila Geary photographed and added approximately 250 slides of the living collections, aiming both to fill deficiencies and to record the restoration now beginning on the original path system. In this she had the cooperation of staff members Richard Weaver, Stephen Spongberg and Jennifer Hicks. One hundred slides of trees in the Arnold Arboretum were also provided by the Chanticleer Press, who took the photographs for the Audobon Society's new Field Guide, *North American Trees, Eastern Region*.

Norton Batkin and Sheila Geary made a survey of the collection while gathering material for a grant proposal for their curation. They undertook an inventory and identified target problem areas, including deteriorating nitrate negatives in danger of becoming hazardous. Sheila Geary has begun to keep a numbered list of negatives in the collection that have broken glass plates. She has also reorganized the accession lists that document the collection. There are currently 15 separate lists, which indicate the photographers, the date, and the subject, and provide the only means of access to the collection.

Several projects using the archives and photographic collections at Jamaica Plain were undertaken during the year. Sheila Geary undertook research into the early history and collections policy of the Arnold Arboretum, in preparation of our successful grant application to the National Science Foundation for curatorial support for the living collections records.

This research was then extended with Ida Hay Burch, volunteer and Visiting Committee member B. June Hutchinson, and Norton Batkin to prepare a further grant application to the National Endowment for the Humanities for funds to prepare a guidebook to the living collections. This project will be discussed under publications. The portions of the guide for which we are seeking funding will draw
heavily on archival material; in preparation for this work Sheila Geary and June Hutchinson searched not only our own archives, but those of Harvard University Archives and at the Graduate School of Design, the Massachusetts Horticultural Society, the Northeastern Genealogical Society, the Massachusetts Historical Society and the federal records housed at Waltham, Massachusetts. We are grateful to these institutions for allowing us access to their records. They also spent over 70 hours this year at the offices of Olmsted Associates, examining the original planting plans of the arboretum; 164 complete and sectional maps were duplicated for our archives. They visited the National Archives on February 8 and 9th, 1980, to assess the written records associated with the plans, acquired by the Library of Congress several years ago. This year the Olmsted offices in Brookline became a National Historic Site, under the jurisdiction of the National Parks Service. Owing to the collaboration they have now established with the Park Service staff, special permission for their continued access to the material has been granted. A precursory article, entitled "Jackson Thornton Dawson, Plantsman" has been submitted to Arnoldia. This served as additional documentation for the guidebook grant proposal and as a test case to establish whether the research undertaken would, as envisaged, document the history of the arboretum in humanistic terms.

A survey of funding sources for E. H. Wilson's plant exploration expeditions to China, including a list of donors, was prepared and added to our archives.

As a consequence of all this work our own archives have expanded three linear feet.

In her capacity as archivist at Jamaica Plain, Sheila Geary handled a variety of reference questions, including some from descendants of former staff members. Horticultural intern, Ed Bemis, was able to provide information on the Jesup Wood Collection to a correspondent in Portland, Oregon. The information, culled from various sources in the library, was gathered and added to the archival collection. Twelve queries drawing on the Arnold Arboretum's archival resources were filled or referred to the Gray Herbarium. One hundred and sixty copies of archival material were supplied.

When the addition to the Herbaria Building was formally opened on May 23, the library mounted a small exhibit of staff publications.

**RESEARCH**

The official visit to the Arnold Arboretum by a party of botanists from the People's Republic of China in May, 1979, has been followed by a welcome and increasing collaboration in research. In August Professor Chin Yung Cheng, of Peking Medical College and a former student of Professor Reed Rollins of the Gray Herbarium, came to extend her work in the herbarium and library on Chinese Celastraceae. Professor Cheng, who remained until the end of November
was the recipient of a Mercer Fellowship. We are anticipating additional and longer-term visitors within the next two years. Dr. Stephen Spongberg, who in June, 1979, had attended the meetings in California that terminated the visit of the Chinese party, in the coming fiscal year will represent the Arnold Arboretum, one of five American institutions which together will mount the first Sino-American field expedition since the 1950 Chinese revolution. The expedition is being sponsored by the Botanical Society of America; while in China it will be hosted by the government of the People's Republic.

The director, with assistance from the Atkins Fund of Harvard University, visited Indonesia in June, 1980, where he completed his taxonomic revision of the Dipterocarpaceae of the Far East. Following this visit he attended the second Dipterocarp Round Table at the Forest Research Institute, Malaysia, where he presented a paper and chaired the final session. The publication of his semimonographic revision of the family for Flora Malesiana is imminent. A further paper on the new American Subfamily Pakaraimoideae was published, with Dr. Bassett Maguire of the New York Botanical Garden. While in Indonesia Dr. Ashton had discussions with the director and staff of the National Biological Institute, and an agreement for collaboration in research and training was drafted. With Dr. Stevens, Dr. Ashton has been awarded a grant by the U.S. Department of Agriculture Forest Service, to supervise a postdoctoral appointee who will conduct research on wild bread-fruits and tree figs (Moraceae) for the Sarawak, East Malaysia, Forest Department over two years. Dr. Richard Primack, a former Harvard student and now an assistant professor at Boston University, was appointed in April, 1980; he left for Sarawak in early July. Dr. Primack is interested in future collaboration with the Arnold Arboretum in the research training of botanists from the Far Eastern tropics; this field research will therefore provide him with a useful opportunity to broaden his experience of this region.

Dr. Ashton continued to serve on a committee of the National Academy of Sciences, chaired by Dr. Peter H. Raven, charged to establish research priorities in tropical biology. He convened and chaired a panel of Asian biologists in Thailand to select an Asian site for long-term ecosystem research, and coauthored the final report of the committee which was published in 1980. Dr. Ashton gave the Barnes lecture at the Morris Arboretum of the University of Pennsylvania as well as invited lectures at Duke University, the University of Massachusetts at Amherst, the Universities of Western Ontario and of Guelph, and the Missouri Botanical Garden. He talked to the New England Botanical Club and the Society for Expeditionary Biology at Harvard. He presented a paper at a workshop on the aging and measurement of growth of tropical trees sponsored by the National Research Council and held at Harvard Forest. He also attended the annual convention of the American Association of Botanic Gardens and Arboreta at Atlanta, Georgia. While in Indonesia, Dr. Ashton gave
First year graduate student Steven Rogstad is advised by Dr. Ashton; he is investigating the infrageneric classification of *Polyalthia* (Annonaceae), understory trees in Old World tropical forests, with a view of pursuing field research on niche differentiation among closely allied species sharing the same physical habitat. With Dr. Otto T. Solbrig, Dr. Ashton advises Paul A. Cox, who is completing research on the reproductive biology of *Freycinetia reineckii* (Pandanaceae), a Samoan epiphytic vine; and, with Dr. Thomas Givnish, first year graduate student Paul Rich.

Professor R. A. Howard has concentrated this year on his research into the flora of the West Indies. A grant from the National Science Foundation supports this study. The third volume of his *Flora of the Lesser Antilles* appeared in July. This volume treats the families of Monocotyledoneae; work is continuing on Dicotyledoneae. He is engaged also in two studies in historical botany: the transliteration, editing and eventual publication of an unpublished "Hortus of the West Indies," written by Alexander Anderson in 1803 and on loan from the Linnean Society of London; and biographical and bibliographical research on William Hamilton, with an evaluation of his *Prodromus Plantarum Indiae Occidentalis* of 1825. Dr. Howard has prepared a checklist of the flora of Montserrat for the Montserrat National Trust, and is engaged in collaborative ecological studies on the changes in the vegetation following the 1977 eruption of the Soufrière of Guadeloupe with the staff of the Office of Forests. Dr. Howard studied in the libraries and herbaria at Kew, the British Museum, the Linnean Society, Royal Society and Royal Geographical Society in London in July and August, 1979. In February and March, 1980 he was in the West Indies, conducting field work in Jamaica, Puerto Rico, St. Thomas, Barbados, St. Vincent, and Montserrat. He was able to search church and government records in Barbados and St. Vincent for information on Anderson. He climbed the Soufrière of St. Vincent to photograph, collect and record data on the 1979 eruption. He collected in Montserrat in cooperation with the National Trust of that island; there he rediscovered the shrub *Xylosma serrata*, previously known only from the original nineteenth century collection.

Dr. Howard also found time to complete a manuscript on E. H. Wilson as a botanist, discussed further under publications. As a member of its editorial board, he attended the meeting of the Organization Flora Neotropica held in January, 1980, where he gave a seminar; that of the American Institute of Botanical Sciences at Stillwater, Oklahoma in August, 1979, also presenting a paper; and that of the A.A.B.G.A., of which he is a past president, in Atlanta, Georgia in April, 1980. At Atlanta he was the recipient of an Award of Merit from the A.A.B.G.A. He attended meetings, as scientific advisor, of the board of the Bloedel Reserve of the University of Washington Arboretum, and of the Dallas, Texas Arboretum Society where he lectured.
In addition to research at the Arnold Arboretum staff members carried their work to distant places. Among them, Director Peter Ashton worked in Indonesia (upper left) on the Dipterocarpaceae; Dr. Bernice Schubert (upper right) pursued research on Desmodieae at the National Herbarium in Mexico City, and Dr. Richard Howard climbed the Soufrière of St. Vincent (bottom) recording the effects of its 1979 eruption.
He also lectured at the Brooklyn Botanic Garden, at Framingham State College, Massachusetts, and at the Winterthur, Delaware, Gardens Conference.

Dr. Shiu-ying Hu, though retired, continues her research on Chinese medicinal plants. She attended the third annual symposium of the Society of Herbs at the University of California, Santa Cruz, in August, 1979, presenting a paper at the ginseng session; at this meeting she was honored with the Agnes Arber Distinguished Service Award. In September she participated at the first International Conference on Traditional Asian Medicine at Canberra, Australia, where she helped organize the International Association for the Study of Traditional Asian Medicine. She later visited New Zealand where she gave a seminar at Christchurch University, and Fiji. In May, 1980 she spoke on Chinese women in the practice and knowledge of herbal medicine at a celebration of the role of women in herbs at Cornell Plantations, and the dedication of a sculpture, "The Yarb Woman," by Elfriede Abbe, in the Robinson York State Herb Garden at Cornell University. Dr. Hu received the Certificate of Honor of the Holly Society of America for her outstanding contributions to the greater appreciation and scientific knowledge of the genus *Ilex*.

Dr. Norton G. Miller this year identified bryophytes (22 species) in an assemblage of fossil plants recovered from early or middle Illinoian sediments (ca. 100,000 years old) located in southern Illinois. The assemblage is comprised of calciphilous mosses of various upland and lowland habitats. The species are now largely restricted to north temperate and boreal latitudes, and thus their occurrence in mid-latitude North America represents a disjunction of considerable significance. The results of this study will be integrated with other kinds of data in an effort to define the paleoenvironments and paleoecology of the region. Few other data from this region and period of time are available. The project was undertaken in association with S. T. Jackson, a graduate student at Indiana University. An additional 300 pounds of sediment from the Columbia Bridge deposit (see previous report) has been processed for plant fossils, and many new additions to the flora were discovered. These have been identified in part by use of the scanning electron microscope and in part by other techniques. When the new material has been studied thoroughly it will be the basis of a paper in which the paleoecology of the site will be discussed in much more detail than was possible earlier. Information from specialists on the animal groups Ostracoda and Coleoptera, fossils of which are present in the sediments, will also be integrated. During April and May work on a revision of the taxonomy of the Australasian moss genus *Trachyloma* was resumed. In spite of some knotty problems, the solution of which is hampered by inadequate herbarium collections, progress has been made, and it is anticipated that the revision will be completed by the end of the summer.

Dr. Miller has directed the research of three graduate students. Peter Alpert's thesis research, co-sponsored with Professor R. E. Cook,
has been pursued with the assistance of an NSF Doctoral Dissertation Improvement Grant. It concerns the general scarcity of bryophytes in arid environments, which he considers to be a function of a plant's inability to maintain a positive carbon balance under such conditions. Cecilia Lenk is investigating the post-glacial population dynamics of *Fagus grandifolia* at its northernmost distributional limit in northeastern North America by use of a combination of ecological and palynological techniques. Brent Mischler's dissertation research is a taxonomic study of *Tortula* (Musci: Pottiaceae) in North America and Mexico. With support of the Anderson Fund Brent has been in Canada and in part of the western United States locating and observing populations and gathering materials for study in Cambridge.

Dr. Miller presented a paper at the AIBS meeting at Stillwater, and another at the Taxonomic Workshop of the International Association of Bryologists at the Geneva Botanic Gardens in late August, when he also chaired the session on Bryophyte floristics in the temperate Americas and in the polar regions. While in Switzerland he participated in an excursion of the Bryologisch-Lichenologische Arbeitsgemeinschaft für Mitteleuropa to Grimsel in the central Swiss Alps. He also lectured at Wake Forest University and at Duke University, North Carolina, and to the New England Botanical Club. With D. T. Webb of Brown University, he organized the Northeastern North America Palynology Workshop, which was held at Harvard Forest in September, 1979.

Dr. Bernice Schubert has been able to give full attention this year to her research in Leguminosae subtribe Desmodieae; a study is soon to be completed. A treatment of *Desmodium* for the *Flora of Panama* was completed and submitted for publication. This treated 24 species; the large number of recent collections necessitated extensive study. Critical studies on three difficult Central American species groups in the same genus are in progress. A larger scale revision of the species occurring in Oaxaca, Mexico will be Dr. Schubert's contribution to a collaborative effort, with colleagues in the National Herbarium at the Institute of Biology, University of Mexico, to a treatment of Leguminosae of Oaxaca.

During the past year also, through the kindness of Professor Gerald B. Ownbey, University of Minnesota (Saint Paul), the Arnold Arboretum was the recipient of that portion of the botanical reliquiae of the late Dr. Temple Clayton pertaining to *Dioscorea*, and consisting of specimens, photographs, manuscripts, observations, and other materials. The process of evaluating this material and incorporating whatever possible into our collections has begun and should be completed by the end of the summer; any part of this gift added to our collections will subsequently be appropriately labeled. Since Dr. Clayton studied and photographed many types of *Dioscorea*, this material will be most useful in continuation of the current studies of the genus. A good many other interesting specimens, including species previously unrepresented in our collections have been curated and added. Some progress has nevertheless been made towards a revision of *Dioscorea* for
the Flora of Veracruz, in collaboration with colleagues in Instituto Nacional de Investigaciones sobre Recursos Bioticos (INIREB) at Xalapa. Dr. Schubert spent two weeks in Mexico during November, 1979, on this work.

Dr. Schubert visited Mexico again between February 22 and April 12, 1980, when she was sponsored by the University of Mexico to run a course in botanical nomenclature and taxonomic techniques. This gave her the opportunity also to study recent collections of Desmodium at the University herbarium, and particularly those from Oaxaca. She served there on a degree committee, and also lectured to the Sociedad Botanica de México and again, briefly, visited Xalapa.

In September, 1979, Dr. Schubert attended the national convention of the American Begonia Society.

Dr. Stephen Spongberg's research during the past year has continued to be centered around the theaceous genus Hartia but has expanded to include the simple-leaved species of Sorbus from eastern and southeastern Asia. The large number of unidentified specimens in the herbarium of the Arnold Arboretum have been tentatively identified and work toward a revision of the Asian species will be continued.

In connection with his own work, and to facilitate the taxonomic studies of other arboretum staff members, Dr. Spongberg has regularly scanned all incoming periodicals in the combined libraries of the Arnold Arboretum and Gray Herbarium in Cambridge and Jamaica Plain. Bibliographic references have been made to all articles pertaining to woody plants of the northern and southern Temperate Zones for addition to the set of "Rehder cards" housed in Jamaica Plain. Over the past year, 1283 references have been added to the card file. At the end of the year Dr. Howard kindly volunteered to collaborate in this time-consuming but invaluable task.

Work also progressed toward a new book on the poisonous plants of northeastern North America, a project that is a collaborative effort between Dr. Spongberg and Ida Hay Burch (See Publications below).

During a visit to England in February, 1980, Spongberg was able to spend four days at the Royal Botanic Gardens, Kew, where he worked in the library and herbarium examining their holdings of Sorbus and also genera in the Theaceae and Magnoliaceae. He also visited the Westonbirt Arboretum where he examined living collections.

Dr. Peter F. Stevens received promotion from assistant to associate professor during the year; at the end of the year he was appointed to supervise the Gray and Arnold Arboretum herbaria. Much of his time this year was spent in seeing his monograph of Calophyllum through to publication in the Journal of the Arnold Arboretum; this is now imminent. Preliminary work, which will ultimately lead to a monograph of Mesua, also in Guttiferae has begun. A manuscript on how to determine which character states are advanced and which primitive has been submitted and accepted for publication.

Paul Groff completed his senior thesis, for which Dr. Stevens was
advisor, on aspects of the growth patterns of Ericaceae tribe Phylloodeae. Additional data now being collected, and a survey Dr. Stevens is making of other characters, will culminate in an evaluation of phylogenetic relationships in the group. Groff's work has demonstrated the great benefit to be obtained from making observations of growth characters on living plants, many of which were growing in our collections. The characters Groff observed proved of systematic value at generic, infrageneric and infraspecific levels, of considerable intrinsic morphological interest, and of importance in providing a basis for the better understanding of the ecology of the plants. Dr. Stevens is extending his own observations on the morphology and dynamics of branching with particular reference to Sapotaceae and the Urticales. In both these groups there seem to be common patterns of lateral branch construction that are maintained despite their different methods of growth. As a result of this, each group can apparently be reorganized by certain inconspicuous but constant characters, their consistency seemingly consequent on developmental constraints. Elizabeth Taylor completed her first year as Dr. Stevens advisee; Stevens also continued, with Professor R. E. Schultes, to advise Jeff Hart on his research into some South American Labiatae.

Dr. Richard Weaver, notwithstanding commitments to the planning and implementation of the restoration of the living collections as well as their curation, and to the compilation of a guidebook to the arboretum, has continued his taxonomic revision of Staphylea. A popular treatment has been submitted to Arnoldia, and a formal one will follow before the end of 1980.

This spring Dr. Weaver, with Dr. Alice Tryon collaborated with and advised undergraduate William Baikama, who made chromosome counts in Hamamelidaceae growing in the living collections. Baikama verified previously reported numbers in several taxa and successfully made the first known count of Loropetalum chinense. The work is to be continued in fall 1980 before being written up.

Professor Carroll E. Wood pursued no personal research during the year, but advised three graduate students, Christopher S. Campbell, Elizabeth Coombs, and Michael Donoghue, and a junior, Roger Cantu. Campbell completed his thesis, entitled "Biosystematic Studies in the Andropogon virginicus Complex (Gramineae)" in May, receiving his doctorate in June. He has been appointed to an assistant professorship at Rutgers University, New Jersey. Donoghue received the George R. Cooley Award for the best paper presented at the annual meeting of the American Society of Plant Taxonomists in Stillwater, Oklahoma, in August, 1979. His paper, "Growth Patterns in Viburnum (Caprifoliaceae) and Their Taxonomic Significance," was based in large part on plants of the 60 species of Viburnum growing in the living collections of the arboretum. A second paper based on these living collections has been published this year in Arnoldia. He is continuing his studies in Viburnum, extending his observations on our living collections by two trips for field work in Jamaica, Central America and
southern Mexico; these were supported by a Doctoral Dissertation Grant in Systematic Biology from the National Science Foundation. He expects to submit his thesis in 1981. Elizabeth Coombs started in Fall, 1979. She was awarded a grant by the National Science Foundation to support field research on the biosystematics of the *Poa sandbergii* complex, work that she initiated at the University of Idaho. Elizabeth Taylor accompanied her in May and June to the coast ranges of California, working from San Diego northwards, from where Coombs returned briefly to the University of Idaho to transfer her living collections to Cambridge; they were found to have received an application of volcanic ash from Mt. St. Helens. A detachment from the Harvard University Herbaria, aided by a supply of potables, helped in the planting of her collections in the experimental garden.

On January 28th a reception was held in the Harvard University Herbaria Library, to celebrate the publication of Lily M. Perry’s monumental and long-awaited treatise on the medicinal properties attributed to plants in East and South-East Asia. Miss Perry was on the staff of the arboretum between 1937 and 1979; this work is the product of a painstaking search for information on herbarium labels and in the literature.

Karen Stoutsenberger, who was on the arboretum staff from November, 1970, to May, 1980, first as botanical illustrator for *The Generic Flora of the Southeastern United States*, edited by Dr. Wood and more recently as botanical illustrator on the staff of the Arnold Arboretum, married David Ku, of Atlanta, Georgia, on March 15. Many of Karen’s accurate and beautiful illustrations have been published in the *Journal of the Arnold Arboretum* and in *A Student’s Atlas of Flowering Plants: Some Dicotyledons of Eastern North America*. Her strong sense of design can be seen on the covers of the *Journal of the Arnold Arboretum*, 1972–1980. Brook Thompson-Mills, research assistant to Dr. Howard, resigned on August 24, 1979; her place was taken by Miss Kristin Clausen. Katherine Holland, secretary to the research staff resigned on August 22nd and was replaced by Lisa Frost.

### EDUCATION

The contribution of our faculty to the advising of graduate students is reported in the section on research.

For readers unfamiliar with the Harvard University courses of instruction, the numbering system requires explanation. Biology courses fall into four sequences: 1-99, an introductory series for undergraduates; 100-119, at middle level and offered for both undergraduates and graduates; 200-299, which are primarily for graduate students but which undergraduates can attend, if sanctioned by their instructor, in their final years; and 300-399, graduate courses of reading and research.

Professors Carroll E. Wood and Norton G. Miller, with Professors
Donald Pfister and P. Barry Tomlinson gave Biology 18, "Diversity in the Plant Kingdom" in the fall; it was rated highly by the students. Professor Wood's Biology 103, "The Taxonomy of Seed-bearing Plants," again received superb ratings in all categories; graduate student Michael Donahue earned high acclaim for his contributions as a teaching fellow in the spring of 1980. Professor Wood also gave Biology 313, "Systematics of Vascular Plants" to three graduate students, and supervised one junior in a Biology 90r research course.

Besides his contribution to the highly rated Biology 18, Dr. Miller gave an undergraduate research course 91r, "Readings in Bryology," and two Biology 305 courses: "Topics in Systematics and Paleobotany"; and "Topics in Paleoecology and Bryology."

Professor Peter F. Stevens gave, with zoologist Professor William L. Fink, their course Biology 148, "Systematic Biology," in the fall. Professor Stevens taught 300 level courses and Biology 90r (supervised undergraduate research), in both fall and spring semesters. He also supervised two students' reading on aspects of plant growth, a Biology 91r course, and gave an honors tutorial. In the summer of 1979 he taught Biology S105 with Dr. J. B. Fisher, of the Fairchild Tropical Garden, Miami, a Harvard summer school course that is based at the Fairchild Garden; this course, as always, was attended by several Harvard students.

Professor Richard A. Howard taught his course Biology 209, "The Phylogeny of the Flowering Plants," in the fall semester. Dr. Howard also presented a guest lecture entitled "Survival and Poisonous Plants," in Professor Richard E. Schultes' Biology 104, "Plants and Human Affairs."

With Professor Rolla M. Tryon of the Gray Herbarium, Professor Peter S. Ashton participated in Biology 147, "Biogeography." In addition, Professor Ashton gave a research course (387, "Tropical Botany") in both semesters.

Eugenia Frey, who joined the staff as plant information coordinator in July, 1979, has taken over responsibility for our public education program in preparation for expansion, which begin in the spring. Our staff has continued to make an important contribution to instruction, with Gary Koller contributing this year in 11 offerings, Richard Weaver in 7, James Burrows and Peter Del Tredici 4 each, Jack Alexander 3, Margo Reynolds 2, and Ida Burch, Eugenia Frey, Sheila Geary, Bruce Munch, Barbara Epstein, James Nickerson, Robert Nicholson, and Jennifer Hicks one each. This year, in addition, graduate students Michael Donoghue, Elizabeth Coombs, Paul Cox, Laurie Dudley, and Christopher Campbell contributed, as did several outside speakers.

Several courses, tours and workshops were offered in collaboration with other organizations in the Boston area; these included the New England Wildflower Society, the Massachusetts Horticultural Society, and Habitat. Our aims here are to demonstrate the cooperative spirit that exists between our organizations, to highlight the distinct role that
each of us plays, and to work together in fields where collaboration will manifestly be to our mutual benefit. In order to attract more good speakers for our growing program, and to operate on an equal footing with our collaborators, this spring speakers were for the first time offered honoraria. This necessitated an increase in the fee charged to participants. With assistance from Norton Batkin, an elegant, new, two-color course brochure was designed.

In fall 1979, 7 courses and 3 workshops (single session courses) were offered; two courses were cancelled for lack of attendance. In the spring 18 courses were offered although 7 were similarly cancelled; there were also 6 workshops, 3 tours to other gardens. The Administration Building and the Dana Greenhouse area offered visitor information for an extended number of weekends, this spring, thanks to staff and volunteer help. In addition, a number of weekend programs were offered. Walks in the arboretum, with five bilingual walks, in Spanish and English, were given. A series entitled "Open Spaces in Boston: A Record of Citizen Involvement," to which Bostonians prominent in environmental affairs contributed, was held on Sunday afternoons. The Wednesday luncheon series, at which staff speak on alternate weeks from October through April continued to be popular. The series "Evenings with Friends" was held again at the Red Schoolhouse at the Case Estates on Tuesday evenings in the fall, as was the spring program that traditionally has complemented it, entitled "Meet the Staff." An average of 65 attended the Wednesday luncheon series, which are free. Registration for the remaining fall 1979 offerings was 171, but in the spring there were 370 registered, which we anticipate will be exceeded in fall 1980. Anne Johnson and Nancy LeMay provided much help in the administration and organization of the programs.

Four exhibitions were mounted at Jamaica Plain. Volunteer Cora Warren's exhibit "Spreading Roots," spanning the history of plant introductions and exchanges in North America, was shown during August–October, 1979, followed in November–January by "New England Gardens Open to the Public," a selection of photographs by Cymie R. Payne and from the Arnold Arboretum collection. During February–May an exhibit entitled "Roots" was shown, prepared by the Morris Arboretum for the University of Pennsylvania and presenting the growth, distribution, function and cultural needs of tree roots. Finally, "The Tallgrass Prairie: An American Landscape," was loaned from the Smithsonian Institution Traveling Exhibition Service between May–July. The arboretum exhibit at the Massachusetts' Horticultural Society's Spring Flower Show is described in the section on public service.

With the help of Harvard senior Debbie Van Ryn, Eugenia Frey organized an education program to complement the work schedules of the 1980 Summer Horticultural Trainees. A series of ten walks, twelve lunchtime lectures and three special events, two of which were trips, was organized. The active participation of many staff and volun-
teers make this a valuable program and contributed to the excellent morale and performance of the trainees this season.

**PUBLICATIONS**

Our current publications policy was summarized in my last annual report. I there discussed our intention to increase the circulation of *Arnoldia*, and plans for the future publication of four books. Norton Batkin assumed the position of publications officer in August, 1979.

In July, 1979, the third volume of Dr. Howard's *Flora of the Lesser Antilles*, which treats the Monocotyledons, appeared with family revisions by himself and several collaborators.

Stephen Spongberg and Ida Hay Burch continued their work on a book on the poisonous plants of the northeastern United States. Thanks to a donation from Mr. Walter Hunnewell and the Gillette Company, plans to illustrate the book with fine photographs are proceeding. Mr. David C. Twichell is collaborating on the photographic work, which neared completion this year with the accumulation of contact prints of all but a few of the species to be included. The text will be based partly on study of references at the Countway Medical Library of Harvard University.

The illustrations for a book on the China of Ernest Wilson, the great plant explorer who worked for the Arnold Arboretum between 1908–1930, have been prepared by photographer Peter Chvany. Research for the text has been completed by Richard Howard, and two preliminary articles are to appear in the May–June, and July–August, 1980, issues of *Arnoldia*. The publication of this book and of a collection of Esther Heins' watercolors of plants growing in the Arnold Arboretum, has been delayed by the absence of a source of funding. Grant proposals are to be prepared.

The editor of the *Journal of the Arnold Arboretum* is Dr. Stephen Spongberg; Elizabeth B. Schmidt, formerly assistant editor, has been appointed managing editor. During the past year the Editorial Committee was reorganized to include Dr. Ashton, and Dr. K. S. Bawa of the University of Massachusetts, Boston, as our outside member.

The long association of the *Journal* with the Harvard University Printing Office, conveniently located in the Allston section of Boston, ended in 1979 with the publication of the October number of Volume 60. For reasons of economy, as well as the eventual phase-out of hot type composition at the Harvard University Printing Office, the Editorial Committee decided, after a considerable number of bids had been received, to give the contract to Edwards Brothers, Inc., of Ann Arbor, Michigan, for the production of Volume 61 (1980). While paper and cover stock remain the same, cold type composition is being utilized,
requiring a different type face. Slight changes have also been adopted including the placement of copyright (where applicable) and bibliographic citation (journal title, volume number, pagination, and date) at the bottom of the title page of each article, and the initiation of each article on a right-hand page. These changes have facilitated printing and binding of offprints and have allowed the use of identical offprint covers (printed on Journal cover stock) for all offprints of a given volume. The January, 1980, number attests to the quality of Edwards Brothers' work; despite the distance between the editorial office and the printer, work has continued to run smoothly and at considerable savings.

Despite the economies realized, the Editorial Committee determined it necessary and reasonable to request authors to help defray production expenses. Beginning with manuscripts received and accepted for publication as of March, 1980, a page charge of $20 is to be levied. Acceptance of manuscripts for the Journal will continue to be based solely on appropriateness and scientific merit rather than on an author's ability to meet page costs. As a result of these changes, the subscription price of $25.00 per volume will be maintained for the time being. Our custom of providing authors with free reprints (50 for outside authors, 100 for those in-house) will be continued. Further, an updated set of instructions to authors will be published once annually in the Journal; the use of standardized bibliographic abbreviations may be introduced. Subscriptions, including library exchanges, currently number 706.

The July, 1979, number of the Journal of the Arnold Arboretum, the first to be published during the fiscal year just ended, was appropriately dedicated to Bernice G. Schubert, who had recently completed fifteen years of devoted and tireless service as editor and chairman of the Editorial Committee.

During the last fiscal year three numbers of the Journal of the Arnold Arboretum have been published. The last number has been delayed intentionally and will be published simultaneously with the July, 1980, issue; both numbers will be exclusively devoted to P. F. Stevens' manuscript, "A Revision of the Old World Species of Calophyllum (Guttiferae)," and together will have more than 600 pages. Publication of this large manuscript is consistent with the emphasis on monographic taxonomic research at the arboretum; the Journal, with its wide and established circulation in Asia where Calophyllum has its center of diversity, is clearly the most appropriate medium of publication. To mark the publication of this monograph, a new cover design as well as new devices were drawn by Karen Stoutsenberger for Volume 61. These are based on the shoots and fruits, as well as on hairs which are of so much taxonomic importance in Calophyllum.

The three numbers of the Journal (Volume 60, numbers 3 and 4; Volume 61, number 1) published during fiscal year 1979-1980 include 334 pages devoted to seventeen articles by nineteen authors. S. Y. Hu
The Arnold Arboretum can provide extraordinary opportunities for nature photographers. Volunteer Al Bussewitz, one of the finest photographers working on the arboretum grounds, captured these images of wildflowers growing in the living collections.
During the year the Arnold Arboretum played host to Mrs. Barbara Abbott, the sole direct descendant of plant explorer, E. H. Wilson. Mrs. Abbott (right) made a surprise gift to the arboretum: an unpublished manuscript by her illustrious forebear (left).

and S. A. Sponberg were arboretum staff who published in the Journal during this period. Six of the nineteen authors are associated with foreign institutions (in Argentina, the Federal Republic of Germany, and New Zealand), while the remaining authors have affiliations with American institutions. The majority of articles report studies that have directly or indirectly utilized the herbarium and associated collections held by the Arnold Arboretum and other botanical institutions at Harvard University.

Manuscripts are presently on hand for issues into Volume 62, which will appear in 1981. Seventeen manuscripts have been received during the past fiscal year; of these, two were withdrawn by the author, five were rejected, one is currently being reviewed, and the remainder accepted for publication. The delay in publication time has been, in part, caused by the publication of Stevens' large Calophyllum manuscript, and mention should be made of the unflagging efforts and skill of Elizabeth Schmidt, the managing editor, in handling it. Thanks are rendered to our many outside reviewers, and to the members of the Editorial Committee for the time spent in reviewing manuscripts and offering help and advice on technical matters during the past year. Particular thanks are also extended to Dr. Schubert, who was unfailing in her help and advice during the transition of editorship and who has continued in her willingness to help in any way possible. The following persons are also to be thanked for the tedious and often thankless job of reading galley proofs during the past year: Margaret Campbell, Marion Carter, Laura Durr, Emily Lott, Heather...
Miller, Martha Smith, and particularly Sara Cook, who read galley proofs for both the April and July, 1980, numbers.

There was much change in the editorial staff of Arnoldia during the fiscal year. Initially Dr. Weaver assumed editorial duties, but when Norton Batkin was appointed as publications officer he became managing editor of Arnoldia, with Weaver remaining editor. Barbara Epstein remained circulation manager. An editorial committee was formed; it now includes R. Weaver, chairman; P. Ashton, N. Batkin, J. Burrows, B. Epstein, R. Howard, and Roger Swain, who is scientific editor for Horticulture magazine as outside member. The principal responsibilities of the Editorial Committee are to review manuscripts before publication, to advise on policy matters, and to help solicit articles.

During fiscal year 1979–1980 the last three issues of Volume 39 were published, with a total of 134 pages. Only the first issue of Volume 40 has been published to date, with a total of 48 pages. The average number of pages per issue is 48, a size we feel to be ideal. Number 2 (March–April), containing 3 articles, will appear in early August; and issue 3 (May–June) in late August, containing 3 articles.

In the past the great majority of articles were written by staff members. This year, of the 17 articles for the fiscal year 5 were contributions from outside our staff, and 1 was from a foreign author. "Flowering Times in Viburnums" by Michael Donoghue was the first article written by a graduate student to appear in Arnoldia in recent years while the "Introduction of North American trees into China" by C. K. Cheng represented the first article written by a foreign author. This broadening is consistent with our plan to serve a larger readership.

There have been other significant innovations in Arnoldia but the regrettable lateness of the issues has counteracted any constructive changes. These include the use of an illustration on the back as well as the front cover (July–August, 1979); the use of a second color in cover photographs and the addition of a staff list on the inside front cover (September–October, 1979); and the initiation of a regular series featuring outstanding plants of the Arnold Arboretum, as well as a list of books received from publishers to be considered for review (March–April, 1980). Less tangible improvements include tightening up the format of the magazine, more careful editing, and improvement in the quality of the photographs.

Sheila Geary, Ida Hay Burch, and June Hutchinson have undertaken extensive research in preparation for a first comprehensive guidebook to the Arnold Arboretum. It is intended that this be published in an innovative format. A core will describe the history, design and purpose of the arboretum and will be published in a loose-leaf form whilst additional chapters will address a range of subjects, from detailed guides to individual collections, accounts for the seasons and botanical texts for teachers taking classes in the arboretum, to descriptions of the ethno-botany of North American trees. These will be
sold separately and added to the core; they can also be added to as authors are found, and independently reprinted or revised as necessary. A grant proposal for partial outside funding has been prepared and submitted.

As mentioned in the section on the living collections, a proposal has also been prepared to assist in funding a new map for our collections. Simplified and reduced onto one sheet, it will be printed and placed on public sale as an accessory to the guidebook.

We this year reestablished links with Barbara Abbott, sole direct descendant of E. H. Wilson. Mrs. Abbott has been made an honorary Friend of the Arnold Arboretum. We were surprised and excited to receive the gift of a typescript by Wilson for a three volume popular work which he had planned to publish on his best known introductions. Incomplete and in need of extensive editing to bring it to contemporary audiences, it nonetheless has considerable potential and we hope, in due course, to have it prepared for publication.

Harvard University Printing Office used the Arnold Arboretum as the theme for the photographs for this year’s university calendar. Norton Batkin and Sheila Geary assisted in the selection of the photographs from our collection.

A list of publications of staff and associates that appeared during the 1979–1980 fiscal year follows this report.

**PUBLIC SERVICE**

The Arnold Arboretum is situated within the city of Boston and forms part of the City Parks System. Frederick Law Olmsted conceived of the arboretum as the component within the “emerald necklace” which should have education as its most significant function. Public education remains an important function of the Arnold Arboretum. However, the majority of our visitors come primarily to relax: to jog, exercise the dog, walk with the children or lie in the cool shade of an old tree.

The future of the Arnold Arboretum lies in the hands of its visitors, and especially those who reside in Boston. Without the participation of our neighbors, for instance, it will become increasingly difficult to maintain the collection and grounds in the healthy, tranquil and litter-free condition which we all desire. We are convinced that increasing visitation, and a close and active collaboration with our neighbors, can do much to limit the vandalism and litter problems that we presently suffer. We have therefore practical reasons as well as a moral responsibility to provide increased service to the community.

For their part, members of the community contribute to our work by serving as volunteers, by joining our member organization, the Friends of the Arnold Arboretum, or — and the importance of this
Frederick Law Olmsted and Charles Sprague Sargent intended the Arnold Arboretum for a dual purpose: education and recreation. There is no doubt that the majority of visitors see the arboretum as an appealing setting for relaxation, for exercise, even for art. Photographs by C. Lobig, R. Weaver, and A. Bussewitz.
An unexpected gift of five electric trams from the St. Joe Minerals Corporation in St. Louis brought internal transportation to the Arnold Arboretum, years ahead of schedule. Photographs by N. Lemay.
cannot be overemphasized — by maintaining an active interest and speaking on our behalf in the community.

We have kept this in mind in building our staff and filling vacancies over the past year. Several changes in our staff should be noted. Ms. Margo Reynolds, public relations officer and chairman of our public relations committee, resigned at the end of April, 1980. Ms. Hope Wise has been appointed in her place, beginning in July. As reported last year, Ms. Eugenia Frey joined us as public information coordinator in July, 1979; her work in organizing the expansion of our public education program has been mentioned above. Norton Batkin, became the arboretum's first publications officer during the past year, and Wendy Marks filled the new position of manager of buildings and public services on June 1st. In addition she is currently acting as chairman of the public relations committee.

It is intended that the manager of buildings and public services will negotiate funding sources and implement various special projects aimed at enhancing public facilities at the Arnold Arboretum. Owing to the unanticipated receipt of five electric trams donated by the St. Joe Minerals Corporation of New York, Ms. Marks has so far concentrated on establishing routing and a regular schedule for them, recording a tour, setting up and implementing a fee that will eventually insure their financial self-sufficiency, and planning the formal inauguration of the service. Each tram carries ten passengers; three, provided with trailers, can take up to sixteen. This past year, they ran on a weekend schedule through November 15th, with special tours for groups by appointment at other times. There have been technical difficulties, partially through our inexperience and partially owing to the hilly terrain of the arboretum.

Under Eugenia Frey's leadership the arboretum staff currently conducts free tours for professional plant people and high school and college groups. Trained volunteers provide garden clubs and other amateur groups with tours on payment of a fee. The 60 tours at the arboretum this spring, a third of which were for schools, represent a threefold increase over the previous year. Five volunteer guides went through a training review program this spring which acquainted them with areas of the collections, the history of the arboretum and the work of the staff. Plans are underway to substantially improve the training of our guides so that we can confidently offer a thorough and well-presented tour program.

Ms. Frey has also been reviewing the plant information service that the Arnold Arboretum offers the public. She has instituted a record keeping system which documents the questions asked, the method of inquiry, the time taken to find an answer and the staff involved. At this stage, owing to incompleteness, the record probably indicates less than two-thirds of the total number of inquiries. During the fiscal year a total of 955 inquiries was recorded, mostly by telephone and during the spring and summer; of this 362 were concerned with cultural questions, 293 with the poisonous properties of plants, 82 requesting sources of particular plants, 61 for identification, 35 regarding propa-
gation and 6 on library references; the rest spanned a variety of areas. A plant information hot-line was established, from 1–2 p.m., Monday–Thursday. During that time Ms. Frey answers simple questions quickly, and calls back or writes to those people who need more obscure information. It appears to have been well received. With Ida Burch, she has established protocol and procedures for calls directed to us by the Massachusetts Poison Information Center. She has also sought legal advice concerning liability for inadvertent supply of mistaken information; the current procedure appears to be the correct one. Ms. Frey has had much continuing help in answering inquiries from Gary Koller, Richard Weaver, Ida Burch, the propagation staff and others.

The Arnold Arboretum community gardens scheme made a degree of progress last year. During 1978–79 there were serious problems of vandalism, the shortage of water, and lack of coordination among the gardeners themselves. These remain concerns, although much has happened this year to help the project run more smoothly. A steering committee was set up to share work and decision making. Headed by Terry Buck, it met twice a month through the year at the Dana Greenhouses. Guidelines for the gardeners were set up, and the general organization of the group is improved. Two workdays were held during the spring and summer to clean up the garden in the South Street area, and an educational program was arranged with consultation from the Greenstock staff of the Suffolk County Extension Service. Two of the gardeners have set up and supervised a successful pilot children’s garden. In March a well was dug; a hand pump is now on order. For its protection, 3 steel I-beams will be placed around the pump, and it will be enclosed in a locked metal barrel. Ninety-one plots have been assigned this year, and people from Jamaica Plain, Brookline, Cambridge, Roslindale, Milton, Boston, Roxbury, Dorchester, and Mattapan are participating. When people of many backgrounds and levels of experience are encouraged to garden together, results are varied: the best side of this is the wide range of produce raised and methods used. The Steering Committee evaluated the plots and reassigned those not gardened on June 1, 1980. They will attempt to advise beginning gardeners, but it has proven difficult to do so because of the different times that people go to the garden area. Vandalism will remain a problem because of the garden site’s exposure and accessibility from all sides, and because unlike most other Boston urban gardens, ours is not the responsibility of a single neighborhood. As a result produce is destroyed, communication between gardeners is impeded, and group morale is dampened. To combat these difficulties, the Steering Committee recommended that gardeners do not plant vine-ripening produce, or construct fencing, both of which seem to invite vandalism. An arrangement for quick relay of telephone messages among gardeners has been established.

On September 25, 1979, Margo Reynolds arranged a press breakfast in the Jamaica Plain Administration Building as part of an effort to appraise the various media of the arboretum’s facilities, programs
Director Peter Ashton talks with Deputy Mayor Katherine Kane during Arbor Day ceremonies held in the Boston Public Gardens, on April 25, 1980. The Arnold Arboretum planted two Korean mountain ash trees (Sorbus alnifolia) near the Charles Street fence. Photograph by M. Reynolds.

Over the past year excess plant material was made available to community groups through Boston Urban Gardeners for plantings throughout the city. Jim Burrows works with volunteer Lynn Borman, removing Ilex specimens for distribution. Photograph by C. Lobig.
and other activities. Representatives of TV, newspapers, and local magazines listened to a talk by Gary Koller on fall foliage coloration, participated in a discussion during which information packets were distributed, and finally accompanied Gary on a tour of the arboretum.

In January, 1980, the arboretum became a member of the Council of Museums of Boston once again after a lapse of several years. Comprised of museums in the greater Boston area, this group meets monthly to discuss items of general interest and to share ideas and suggestions.

The arboretum helped to celebrate Arbor Day in a number of ways. On Friday, April 25, 1980, Director Peter Ashton and Margo Reynolds, along with Deputy Mayor Katherine Kane, City Environmental Coordinator Eugenie Beale and members of the Friends of the Public Garden, took part in a tree planting ceremony on the Boston Common that honored both Arbor Day and the city’s 350 year anniversary. The arboretum contributed two fully grown Korean mountain ashes, Sorbus alnifolia, for the occasion; we thank Mrs. G. Kennard Wakefield for contributing the cost of transplantation. On April 26, 1980, Margo Reynolds attended a further celebration, at Jamaica Plain’s Armenian Nursing Home, at which some conifers were donated for their garden; she prepared an article on tree planting for them, and other literature on tree culture was provided.

Once again the arboretum participated in the Spring Flower Show of the Massachusetts Horticultural Society. This year’s exhibit was entitled, “Landscaping with Foliage.” It received the Massachusetts Horticultural Society’s Trustee’s Trophy, the Creative Design Certificate and a gold medal. The second annual Arnold Arboretum Award, for excellence in the use of rare and unusual north temperate (hardy) woody plants in a complementary landscape setting, was presented at the Spring Flower Show to David A. Haskell and Peter R. Sadeck of New Bedford, Massachusetts for their exhibit entitled “A Pleasure Garden.”

Our staff contributed in numerous ways to the programs of amateur horticultural groups, and to the horticultural profession throughout the year. Several classes of public instruction were oriented toward the interests of such groups. Worthy of note was a plant propagators workshop, organized by supervisor of the living collections, Gary Koller, and propagator, Jack Alexander, at which cuttings of over 60 taxa were made available to the professional plantsmen who participated. Two hundred packets of seed of the pink form of Cladrastis kentukea, from plants grown at the Perkins School in Watertown, Massachusetts were collected and distributed at the annual convention of the International Plant Propagator’s Society.

Arboretum staff lectured extensively in the community. Jack Alexander spoke to the New England Chapter of the American Rock Garden Society and the Brookline Garden Club; Peter Ashton was a keynote speaker at the annual convention of the American Rhododendron Society and spoke to the Chestnut Hill Garden Club, Brookline Emery Bag Club, and Weston Senior Citizens Association, and the
Friends of Boston Public Garden. Richard Howard spoke to the Garden Writers of America symposium at Callaway Gardens, Georgia, to the Horticultural Club of Boston, the Women’s Education and Industrial Union, the Wayland Garden Club, the Women’s City Club of Boston, the Weston Garden Club, and the Hillsborough County Conservation District; and Gary Koller to the Newport Garden Club, the summer employees of the Boston Zoological Society, the New York Nurserymen’s Association, the Transportation Research Board, the Maine Nurserymen’s Association, the New England Nurserymen’s Association, the Massachusetts Arborist and Tree Warden’s Association, the Conservation Commission’s Agricultural Extension Service in Suffolk County, Massachusetts as well as the Massachusetts Landscape Contractors, the Garden Club Federation of Massachusetts, and the American Rock Garden Society (N.E. chapter), and at Blithewold Gardens and Arboretum. He also helped organize and conduct a day-long tour for the Cabbages and Kings Horticultural Group.

Sheila Geary, assistant librarian at Jamaica Plain has prepared an annotated slide show that traces the early history and purpose of the Arnold Arboretum and then outlines our present policy and plans for restoration. Dr. Ashton gave talks based on this show at the Fogg Museum and the Boston Museum of Fine Arts.

The New England Bromeliad Society has held monthly meetings at the Dana Greenhouses. Peter Ashton participated in the WGBH, Boston public television Channel 2 auction; Gary Koller participated in the Sharon King television show and the Doug Debruin Show and was interviewed for First 4 (Channel 4) News.

VOLUNTEERS

Volunteers have helped in almost every phase of our work, and their work has been alluded to many times in this report. Among other achievements, a new system in our slide collection was set up and implemented completely by our volunteers. Volunteers have taught classes, set up exhibits, participated in our Wednesday lecture series and written articles for Arnoldia. Further, we have depended upon the volunteers for help in staffing the flower show exhibit as well as the front reception desk during peak season. Many of our volunteers prefer outdoor occupations and have requested work on the grounds. These jobs include inventories in Jamaica Plain and Weston, collection of specimens for the herbaria, and assistance in mapping and labeling. Volunteers have also helped to reestablish the perennial garden and the ground cover plots in Weston. The greenhouse continues to be a big attraction for our volunteers. Some are employed in seed cleaning or potting. Others conduct the weekly guided tours there. Those who prefer to be indoors have provided valuable assistance in the library and with clerical work. We are especially grateful to one of our loyal volunteers who, along with many other duties keeps the entrance hall of the Administration Building attractive with beautiful seasonal arrangements, all properly labeled.
Volunteers, once again, generously donated time to the Arnold Arboretum, providing essential help in almost every area of operation. Photographs by H. Wise and S. Geary.
Most volunteers have expressed the opinion that while it gives them satisfaction to know that they are helpful, indeed indispensable to the arboretum, they also find that the experience has been personally rewarding.

**FRIENDS**

The Arnold Arboretum is fortunate in having a group of people, known as the Friends who subscribe, and in many cases donate, to our work, and who participate in our programs. In turn they receive unusual plants and other benefits from us. The Friends organization is coordinated by Barbara Epstein, with the able assistance of the public relations officer, Hope Wise. We have continued in our effort to attract new membership, which currently stands at 2200. As part of our policy to involve our neighbors more actively in our work and in the future developments at the arboretum, special emphasis is now being placed on attracting increased membership from our immediate neighborhood. The new drive is beginning to achieve success.

This year we have, as before, offered course participation at special rates, preview receptions to our exhibitions, and our horticultural magazine, *Arnoldia*, to our Friends. On September 30th, 1979, we held our ever popular plant distribution at which special plants, generally unavailable from nurseries and in excess of our needs, were offered to Friends in the barn at the Case Estates. Members were able to select from an unusually wide assortment of over 700 rooted cuttings and seedlings, some of which represented progeny from plants collected during Dick Weaver and Steve Spongberg's 1978 expedition to Korea and Japan. Over 200 Friends attended, coming from every state in New England. The event also attracted a number of new members who received a gift publication along with their plants.

In order to involve our newest Friends in our activities, we extended them an invitation to join some of our seasoned volunteers and the staff in manning our exhibit at the Massachusetts Horticultural Society's Spring Flower Show. Each participant attended a talk on the history of the arboretum, its purpose and future plans, and seven staff members assisted in an orientation program to familiarize them with the material to be exhibited. This proved highly successful, and contributed to our success at the show; it will be repeated in the future.

In April, Friends received their biennial plant dividend. This time Jack Alexander propagated 2000 rooted cuttings of *Itea virginica*, which were sent out by mail. This beautiful plant is a native, and it is the first time that a North American native plant has been distributed.

The series, "Evenings with Friends," was again presented in the schoolhouse at the Case Estates during the fall, with five Friends sharing their horticultural experience with other members. Friends also received special invitations to our Wednesday luncheon lecture series through fall and spring; this year the series began with Dr. Ashton's talk, "Ceylon: Garden of Asia." Several Friends themselves contributed to the program.
GIFTS

Readers may wonder how the Arnold Arboretum is able to embark on a major restoration of its living collections, and simultaneously to expand its public services in a time of severe inflation. The arboretum continues to derive income from the interest on the endowment that past benefactors have donated, and the gifts it receives from its Friends. A major effort is now being made to obtain increased foundation support for the scientific research of our staff, the renovation of buildings and for the curation of our unsurpassed collections. The Arnold Arboretum is fortunate in possessing a modest balance of unexpended funds from previous years; this has allowed us to expand our staff in public service, but this program can only be sustained if in a short time it becomes self-supporting. It is, however, unlikely that grants will be obtained for the much needed restoration and maintenance of the living collections. There is also continuing need for plant exploration, which can only partly be thus subsidized through foundation grants. It is for these purposes in particular that the Arnold Arboretum is dependent on the generosity of its Friends.

The work of the arboretum is significantly enhanced by many of our Friends who choose to sponsor our work by contributing annually as sustaining ($35 p.a.) or sponsoring ($100–500) members, as patrons ($500–1000) or as donors (gifts of more than $1000). We are particularly grateful to those who, realizing that the real income of endowed institutions such as ours is seriously declining, have increased their contributions over the past year to help compensate.

Last year the Arnold Arboretum was the recipient of a generous bequest. Mr. Charles Mead of Weston gave his homsite, of eleven acres together with a house, a garage and an apartment, together with an endowment to maintain the property, to Harvard University for the use of the Arnold Arboretum. The house was built by Mr. Mead’s father, Samuel W. Mead of the well known Boston architectural firm Cabot and Mead, who was responsible for the design, among many notable buildings, of the Boston Athenaeum, and of the first Weston High School and Wayland Public Library. On the property are some very old specimen trees originally obtained by Mr. Mead’s parents from the Arnold Arboretum through the kindness of Jackson Dawson, our propagator from 1873 to 1916. Of historic interest is a collection of rhododendrons and broad-leaved evergreens begun by Mr. and Mrs. Samuel Mead and further developed by Charles Mead and his wife. These collections are being studied to develop an inventory. Additions to the collection will be made from the species and cultivars being grown at the Case Estates.

We wish also to thank the anonymous benefactor who has given us the means to establish an oak woodland wild garden, to be developed along the Oak Path which passes along the southern slopes of Bussey Hill. This inaugurates our planned restoration of the original path systems described in the section on the living collections. Dick Weaver outlines his plan for this wild garden in an article following this report.
Further restoration of the paths, and simultaneous development of the interpretive wild gardens that we would like to install along them, will be made possible by the future support of our Friends.

Thanks to a gift from Mr. Walter Hunnewell, matched by the Gillette Company, Steve Spongberg and Ida Burch will be able to proceed with the publication of their fully illustrated guide to poisonous plants.

The unexpected gift of five electric trams (three of which have trailers) by St. Joe Minerals Corporation of New York has allowed us to install an internal public transportation system, silent and pollution-free, several years earlier than we had projected. These are described in the section on public service.

We continue to receive valuable donations of plant material from nurseries; this year we have the pleasure of thanking the following companies for such gifts: Lawyer Nursery, Plains, Montana; Weston Nurseries, Hopkinton, Massachusetts; Princeton Nurseries, Princeton, and John Vermuelen and Son, Neshanic Station, New Jersey; Herman Losely and Sons, Inc., Perry, Ohio; and Forest Farm Williams, Oregon.

Peter Shaw Ashton
Appendix: Published Writings of the Staff and Associates
July 1, 1979—June 30, 1980


——. Eleutherococcus vs. Acanthopanax. Ibid. 61: 107–111.


——. Outstanding plants of the Arnold Arboretum: Amelanchier arborea. Ibid. 94–97.
Appendix: Staff Members of the Arnold Arboretum
Who Left or Retired During the Fiscal Year 1979–1980

Eileen Twohig, Custodian
Mildred Pelkus, Accounting Clerk
Jeanne Sattley, Horticultural Secretary
Rita Silverman, Herbarium Secretary
Olga Peixoto, Mounter
James Hickey, Curatorial Assistant
Sarah Mellen, Curatorial Assistant
Margo Reynolds, Public Relations Officer
Albert MacNeil, Grounds Staff

Appendix:
Weather Station Data for 1979

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Average maximum temperature
Average minimum temperature
Precipitation
Snowfall
Warmest temperature
Coldest temperature
Date of last frost in spring
Date of first frost in autumn
Growing Season

* The growing season is defined as the number of days between the last day with killing frost in spring and the first day with killing frost in autumn. This period is determined by the last spring and the first fall temperature of 32°F or lower.
Weather Station Data for the First Six Months of 1980

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Average maximum temperature 54°F
Average minimum temperature 34°F
Precipitation 17.58"
Snowfall during winter 79–80 11.6"
Continuous snow cover Feb. 16–24, 1980
Warmest temperature 96°F on June 26
Coldest temperature 3°F on March 1
Date of last frost in spring April 18
Continuous freezing temperature Jan. 31–Feb. 6, 1980

John H. Alexander III