



## Annual Report 1936-1937

TO THE PRESIDENT OF THE UNIVERSITY:

SIR,

The Arnold Arboretum closed a successful year on June 30, keeping well within its income, and yet taking care of essential financial problems as they developed. Gifts for restricted and unrestricted purposes, all extra-budgetary, amounted to \$10,554.00 mostly received late in the year and hence available for a somewhat amplified program in the coming year. Supplementing this a grant of \$1,000.00 from the Milton Fund enabled me to undertake one special research problem during the year. This extra budgetary financial support is most heartening to those who are responsible for maintaining and increasing the prestige of this unique institution.

Fortunate in having an unusually mild winter with little or no winter killing of buds, the floral displays at the Arboretum in May and June were unusually attractive. These are the months when the institution is most extensively visited by the public, and within recent years there has been a very noticeable increase in visitors. A careful check of visitors on Lilac Sunday, May 1937, indicated an approximate attendance of 40,000 on that one day.

The usual program has been followed in the maintenance of grounds and plantings, involving some thinning and transplanting, the removal of overgrown and moribund plants, spraying for protection against noxious insects, and fungus diseases. Necessary repairs have been made to buildings as required, the most extensive operations being on the administration building, involving roof and gutter repairs and the pointing up of all masonry construction.

Attention is called to the fact that office, storage, and laboratory space in the administration building is at a premium. The library and herbarium are overcrowded, with little possible space for expansion, as floor space for new stacks and cases is not available. This very serious situation is discussed under Botanical Collections (p. 305) for it is a matter that vitally concerns two other units within the botanical field.

In an attempt to make the Arboretum more useful to the community and to the horticulturally-minded public in the country at large, considerable progress has been made. Over fifty illustrated lectures were given to various groups on the scope and work of the institution. In the spring, personally conducted tours were arranged for thirty organizations. For use in connection with these lectures, approximately 400 new natural color slides have been

prepared, bringing our collection up to about 700. Preliminary work has been done on a series of natural color films, planned to illustrate the attractions of the Arboretum at various seasons. It is anticipated that these will be completed during the coming year.

During the year the hedge demonstration planting was completed, involving plantings averaging 20 feet in length, covering 115 difficult species. The Wisteria collections were removed from the old site near the Forest Hills entrance, a new trellis was constructed, and these attractive plants replanted near the Bussey Institution building; in close proximity to this planting a collection of 35 named varieties of tree peonies, generously presented by Mr. John Wister, was installed.

The spring plantings involved the actual placing of 521 new plants in various parts of the grounds. In connection with this work the old nursery was entirely rearranged, those shrubs and trees destined for planting in our own grounds being arranged in one area, and the duplicates and not needed material, destined for gifts or exchange purposes, arranged in another section. To take care of urgent additional nursery needs, arrangements have been made to install a large supplementary nursery on the undeveloped Walter Street tract.

In an attempt to check the identifications of the very extensive living collections about 500 new labels with changed names were added, and about 400 broken labels were replaced by new ones. About 2,000 metal labels, and 2,500 wooden display labels were prepared and placed during the year.

Accessions during the year include 2,693 living plants received from various sources within the United States and 263 from foreign countries. Cuttings and scions added 193 to this list. Two hundred packets of seeds were received from eighteen foreign countries. Distributions from the Arboretum included 1,831 living plants to various individuals and institutions in the United States and various foreign countries, 980 cuttings and scions, and 772 packets of seeds. Approximately 6,500 named species and varieties of wood plants are now in cultivation at the Arboretum.

The circulation of the *Bulletin of Popular Information*, one of the means whereby horticultural data are made available to the public has been increased from 612, with 190 paid subscribers early in 1936, to 1,500, of which 1,200 are actual subscribers.

The extension work of the laboratory of plant pathology has been especially heavy during the past year. This is particularly true with reference to requests for information and help on disease problems. Our interest in the Dutch elm disease situation in the United States has been actively maintained. There are indications that the disease is being controlled and to some extent the infected area is being reduced -- especially in the State of New York.

Our work on elm diseases at the adjunct field laboratory on Long Island was brought to a conclusion, and an account of the investigation made there and at the Arboretum by Dr. D. B. Creager is to be published as *Contribution No. 10 from the Arnold Arboretum*. This is a well-

rounded piece of research on the cause, means of spread, and control of a common, destructive, hitherto little understood, native wilt disease of the American elm caused by a fungus tentatively referred to the genus *Cephalosporium*. Its publication was made possible by generous gifts from Mrs. Harold I. Pratt, Miss Helen C. Frick, the Massachusetts Society for Promoting Agriculture, and Mr. George Van Yahres. Further investigations have been advanced including the physical basis of *mycotrophyin Pinus*, control of *Gymnosporangium* rust, and an investigation of *Chrysomyxa*, a spruce-infecting rust.

The cytological work during the past year has included two major projects. The first was a study on the effect of temperature on cell division. Extreme temperature changes may cause chromosome division without nuclear division, nuclear division without cell division, and cell division without nuclear division in the microspore development of *Tradescantia*. Chromosome aberrations also were caused by heat treatment.

The effect of temperature changes in causing chromosome division without nuclear division has been used to induce artificial polyploidy. Preliminary work has produced a tetraploid form of *Secale cereale* which is partially self-fertile, and a small population is being grown for experimental purposes. Similar work is being conducted with many of the shrubs in the Arboretum in order to produce polyploid forms of greater hardness and vigor.

The second cytological project was a study of polyploidy in relation to geographic distribution. A study of the genus *Spiraea* confirms the earlier suggestions that the polyploid forms and species tend to occupy the periphery of the range of distribution. A comparison of diploid and tetraploid races shows a close relationship between chromosome number and cell size in many genera.

This effect is reflected in the number of stomata per unit of leaf surface, and stomata counts can be used as a test of polyploidy in closely related forms and species grown under similar conditions. Stomata counts from herbarium material may be of value in indicating the extent of polyploidy in certain genera.

During the past fiscal year, 24,410 specimens were inserted in the herbarium, bringing up the total to 454,472 mounted sheets. Of these accessions, 16,300 came from China, and 600 from the rest of Eastern Asia, 4,300 came from Malaysia, India and Indo-China, 759 from North America, 568 from Central and South America, and 582 from Australia. Important accessions from various parts of the world, not yet organized, approximate 25,000 additional specimens.

Members of the staff have been engaged in work on special subjects. [Dr. E. D. Merrill](#) has continued his work on the floras of Sumatra, Indo-China, and southern China, and in association with Dr. L. M. Perry has undertaken a critical revision of the species of *Eugenia* of China and of Borneo. In association with Miss Florence Freeman, material has been assembled for a general revision of the known species of *Microtropis*.

[Professor A. Rehder](#) has concluded his study of the ligneous plants described by L6veill6 from eastern Asia and has participated in the identification of collections of Chinese plants. Dr. I. M. Johnston is continuing his studies of Boraginaceae and is actively engaged in identifying a very large and important collection, approximating 5,000 numbers, made for the University of California Botanic Garden in Peru, Bolivia, Chile, and Argentina. Dr. C. E. Kobuski has continued his study of the genus *Eurya*. Dr. Caroline K. Allen has pursued her work on the Chinese Lauraceae and will publish a synopsis of the species of *Litsea*, *Neolitsea* and *Actinodaphne* of China and Indo-China before the end of 1937. [Dr. H. M. Raup](#) has studied during the summer of last year the ecological conditions of the Black Rock Forest in the Hudson Highlands of southern New York and has made general collections in that region.

The policy of making grants to support cooperative botanical exploration has been continued with the Fan Memorial Institute of Biology, Peiping, China, Lingnan University and Sun-Yatsen University, Canton, and in cooperation with the Farlow Herbarium a grant was made to Professor Mundkur to make general collections in northern India.

During the past academic year there have been added to the library 424 bound volumes, 527 pamphlets and 87 photographs, the total number of accessions now comprising 42,971 bound volumes, 12,003 pamphlets, 17,809 photographs, and 300 unbound volumes. A total of 9,590 cards were distributed in the various indices, and 1,894 slips were filed in the supplement to the author and subject catalogue of the library, making the number of slips now ready for publication 24,699. Visitors registered in the library number 168, including many from foreign countries as well as from all parts of our own country.

The usual issues of the "*Journal*" and the "*Bulletin of Popular Information*" have been published. Sixty-six technical, semi-technical, and popular articles prepared by staff members have been published in extra-institutional serials, as listed in the [Journal of the Arnold Arboretum](#) 18: 357-359. 1937.

Late in the year arrangements were perfected for the very extensive Merrill-Walker "*Bibliography of Eastern Asiatic Botany*." This extensive work containing approximately 23,000 author entries has been in the course of preparation since 1927. Its publication was rendered possible by a generous grant from the Harvard-Yenching Institute, a smaller grant from the Smithsonian Institution, and an anonymous gift from a friend of the Arboretum.

Atkins Institution of the Arnold Arboretum, Soledad, Cienfuegos, Cuba. During the summer of 1936, much time and attention was given to the renovation of the plantings injured by the great hurricane of 1935. Badly injured plants had to be severely pruned to remove dead or dying parts, and where root damage had resulted from root twisting, tops had to be cut back to give proper balance between roots and tops and to stimulate new growth. The results have been excellent. Much thinning has been done to permit the development of better specimen plants, and where the same species was represented by scattered specimens, the inferior plants were eliminated.

The living collections were increased by the addition of 390 species. In exchange 721 packets of seeds, 762 plants (including 173 orchids) and 138 cuttings were received. During the year, 1,292 packets of seeds were distributed.

Nine investigators from various parts of the United States were in residence at Harvard House for shorter or longer periods of time, including five students and staff members of Harvard University.

E. D. MERRILL, Director