



## Annual Report 1938-1939

TO THE PRESIDENT OF THE UNIVERSITY:

SIR,

The Arnold Arboretum suffered its greatest single catastrophe in its sixty-six years of horticultural and botanical service in the tremendous damage caused by the hurricane on September 21, 1938. Approximately 1,500 trees were destroyed in its 265-acre tract, the wind velocities at times being estimated at 120 miles per hour. The diversified topography of the grounds fortunately protected many areas from excessive damage, the greatest losses being experienced on the exposed slopes and tops of Bussey, Hemlock and Peters Hills.

As a result of this major catastrophe the entire grounds staff concentrated on the task of removing the fallen trees and in the general rehabilitation work required during the fall and winter months. To facilitate the work the mechanical equipment was increased by the acquisition of a tractor with a cutter bar attachment, a specially constructed low wagon for moving heavy objects, and a power-driven crosscut saw. As another measure of economy a tank and gasoline pump was installed in the service yard to provide for the fuel needs of all motorized equipment. By May, at the time of the great spring displays, the plantings had been placed in a reasonably presentable condition, leaving, however, much pruning, removal of stumps and other work of this nature to be accomplished at a later date. By judicious planning, the utilization of funds provided by friends and supporters of the institution, with a small authorized draft on the credit balance, it was possible for us to consummate the major part of the rehabilitation work with our own staff, retaining throughout the winter months the services of those employees who are normally dropped during the slack winter season. In preparation for the fall planting in the heavily devastated areas, 625 two-to-six-foot stock of hemlock, white pine and red pine have been acquired for the necessary mass and screen plantings, and these will be placed in the fall.

As in past years, the Arnold Arboretum has been the recipient of important extra-budgetary gifts from its wide circle of friends and supporters, as listed in the report of the Administrator of Botanical Collections, the total for all purposes being \$14,544.59. This support has enabled us to make rapid progress in the extensive hurricane damage rehabilitation work, to maintain horticultural botanical field work in strategic places, to increase the library and reference collection resources, to accomplish a great many needed improvements in the

grounds and in the reference collections, and to maintain with greater efficiency the various lines of research supported by the institution, as well as to increase its publications. One restricted gift of \$500 from the Massachusetts Society for Promoting Agriculture enabled us to continue the cooperative horticultural-botanical field work in China initiated several years ago, and another anonymous gift of \$1,000 enabled us to send a staff member to Paris for the purpose of examining types and segregating duplicate specimens from the rich collections of the Paris Museum of Natural History. Notice has been received of a bequest of \$25,000 to the endowment fund from the estate of the late Miss Grace M. Edwards of Boston.

In spite of the great amount of extra work demanded by the extensive hurricane damage referred to above, the general work on the plantings has been reasonably well maintained. Five hundred and eight plants were transferred from the nurseries to their proper places in the permanent plantings, many of these representing species and varieties new to the living collections. A total of 2,423 living plants, 121 cuttings, and 2,225 packages of seeds were received. The largest single seed accession was about 2,000 packets from the Yu collection in Yunnan, the field work being in part supported by a grant from the Arnold Arboretum.

There were distributed to numerous correspondents of the Arboretum 1,173 living plants, 691 cuttings, recipients residing in ten different countries. About 12,000 packets of seeds from the Yu Yunnan collection were distributed to about 40 correspondents in various parts of the world. Supplementary to this distribution, 555 packets of seeds from Arboretum sources were sent to numerous correspondents in the United States and fifteen foreign countries.

The work on the detailed planting maps has been continued. Fifty-six of the section maps have been retraced and the final prints made. The plant locations on the entire series have been transferred to the card catalogue. As the work has progressed, hundreds of name changes have been made, involving new labels, as it has been considered essential to check all former identifications and to unify and modernize the nomenclature.

Through the cordial cooperation of the Boston Park Department the entire boundary fence was renovated, involving extensive replacements of those sections badly damaged by falling trees. About 3,000 feet of permanent tar-macadam sidewalk was also constructed along both sides of the road leading to Bussey Hill.

Supplementing the regular work on the grounds and living collections, [Dr. Wyman](#) delivered about fifty lectures on horticultural subjects to audiences in New England and as far west as Wisconsin and as far south as Virginia. Approximately 2,000 letters were written in response to inquiries regarding woody plants. The usual amount of attention has been given to photography, preparation of slides, and, as an innovation, time-lapse moving pictures of plant movements and opening flowers:

In experimental cytology investigations have been devoted largely to a study of the effects of X-rays on chromosome alterations. It has been found that the types and frequencies

of chromosome alterations increase with the dosage, and are dependent on the time-intensity factor and the temperature at the time of irradiation. This work of special interest to the problem of speciation has been supported, in part, by a grant from the National Research Council.

The improvement of ornamental plants by genetic methods has been conducted by the use of X-ray treatment to produce mutations and gross chromosome changes, by the production of polyploids by treatment with colchicine, by the artificial crossing of species and varieties, and by the utilization of natural hybrids. The more ample nursery space now available has been utilized in growing large numbers of hybrids with the ultimate objective of selecting superior types. About 5,000 hybrid crabapple seedlings and several hundred cherry seedlings are now being grown in connection with the project.

The incorporation of the Arnold Arboretum wood collection with similar material belonging to the [Bussey Institution](#) and the Biological Laboratory has greatly facilitated the work on wood anatomy. More than 3,000 microscopic slides have been added to the collection, the total now being in excess of 20,000. Particular attention has been given to a study of the woods of selected families, including the *Juglandaceae*, *Olacaceae*, *Santalaceae*, *Sapindaceae*, *Rutaceae*, *Anacardiaceae*, *Meliaceae*, *Burseraceae*, and *Icacinaceae*.

In plant pathology the activities have been extensive, including extension services, diagnostic and identification work, a continuation of interest in the Dutch elm disease eradication program, and field work in New England, Quebec and Mexico. Valuable additions have been made to the collections of pathological material. About 1,000 duplicates were presented to the Farlow Herbarium, and 300 to the United States Department of Agriculture. Research work has been accomplished on a wilt disease of *Gleditsia*, on a bark disease of the flowering dogwood, and on the rust fungi of the conifers and of the *Pomaceae*. A significant monograph of Uredinopsis was issued as a number of the *Contributions from the Arnold Arboretum*.

While only 5,218 sheets were actually distributed into the herbarium, a relatively small number, in excess of 38,000 additional sheets were mounted, mostly from collections under study and hence not yet ready for distribution. The total number of incorporated herbarium sheets is 484,942. The year was characterized by an unusually large number of important accessions, approximating 111,500 specimens, not including duplicates. Of these about 53,000 specimens were from Asia, approximately 38,600 from China alone. In no other single year in the entire history of the institution have such extensive collections been received. Important individual collections include about 5,500 numbers, averaging five specimens to a number, from the Mount Wilhelmina region of Netherlands New Guinea, a previously unexplored area. These were collected by [Mr. L. J. Brass](#), a member of the Richard Archbold expedition affiliated with the American Museum of Natural History. The extensive Chinese collections came from Kwangsi, Kweichow, Kwangtung, Hainan, Yunnan, Szechuan and Hopei, largely through cooperative exploration through the Fan Memorial Institute of Biology, and Nanking, Lingnan

and SunYatsen Universities, this in spite of the present unsettled conditions in China. Extensive Indian collections were received from the Royal Botanic Gardens, Calcutta, Burmese collections from Judson College, Rangoon, and important exchanges from the Botanic Gardens, Singapore, Bureau of Science, Manila, and the Principal Botanic Garden, Leningrad. From the Botanic Garden at Geneva, 11,480 duplicates were received in one shipment, while approximately 18,000 specimens came from the Paris Museum of Natural History, these largely from historical collections in China, Indo-China, and New Caledonia. Historically important Poeppig specimens from Vienna, and the Koehne Lythraceae herbarium from Berlin are worthy of special notice. Approximately 14,000 specimens were received by purchase or by exploration from various parts of North America.

In continuation of exchanges 50,017 duplicates were sent to various American and foreign institutions, while 14,470 specimens were transferred to the Gray Herbarium, 1,931 orchids to the Ames Orchid Herbarium, and 1,205 cellular cryptogams to the Farlow Herbarium. Forty-five loans, approximating 4,000 sheets were made to different institutions in America, Europe and Asia, while 52 loans with about 8,511 specimens were received from 23 institutions in the United States, Canada, Netherlands, France, Germany, England, Scotland and Sweden, for the use of our own staff members. Photographic negatives representing 228 types or critical specimens were prepared, bringing the total up to 3,951, while 3,790 index cards brought the total of these to 121,117 entries in the current card catalogue of new binomials.

To facilitate herbarium work between 20,000 and 25,000 clipped or typed descriptions were incorporated into the herbarium, work on the segregation of material in the large genera in colored genus covers for specific geographic areas was continued, and all the entries in *Index Kewensis* and its nine supplements were clipped, and arranged in loose-leaf ledgers in one sequence, forming six great volumes.

The technical work accomplished has been extensive. [Professor Rehder](#) has completed the manuscript for a thoroughly revised edition of his *Manual of Cultivated Trees and Shrubs*, which will appear next spring. Work on *Eurya* and *Jasminum* has been continued by Dr. Kobuski, on the Old World *Lauraceae* by Dr. Allen, a study of *Microtropis* by myself and Miss Freeman has been completed, much work has been accomplished by Dr. Perry and myself on the New Guinea (Fly River) collections of Mr. Brass (Second Archbold Expedition, and on very extensive study collections received for identification from China, Indo-China and Burma. Dr. Johnston continues his work on the *Boraginaceae*, and on the identification of extensive collections of South American material received for study and report. Dr. Jones completed a revision of American *Sorbus*, and has practically finished a study of *Symphoricarpos*, while Miss Chen has continued her work on the Chinese species of *Bauhinia*, and has nearly finished a treatment of the eastern Asiatic species of *Ormosia*.

In field work Dr. Johnston spent two months collecting in northern Mexico in association with Dr. Forrest Shreve of the Carnegie Institution, [Dr. Raup](#) spent the last summer in field work at the Harvard Forest, Petersham, and left in May for his long projected trip to the South

Nahanni River region in northwestern Canada. Through modest grants to resident collectors and botanists extensive field work has been accomplished for the Arboretum in Yunnan, Szechuan, British Columbia, New Caledonia, the Philippine Islands, Burma and Malaysia.

The library accessions comprise 566 bound volumes, 166 pamphlets and 266 photographs, the total now being 44,123 volumes, 12,469 pamphlets, 18,444 photographs, several hundred unbound volumes, and 3,000 slides. A total of 10,858 cards were distributed in the various indices, and 1,781 slips were prepared and filed for the author and subject catalogues. Books bound, mostly periodicals, amounted to 223. Seven new periodicals were acquired, as well as a number of important atlases. Arrangements were made with the University Library for the incorporation of all author entry items in the Arnold Arboretum library in the comprehensive card catalogue of the larger institution.

Publications include the regular issues of the technical *Journal of the Arnold Arboretum*, the popular *Bulletin of Popular Information*, and one number of the technical *Contributions*. The detailed bibliography of the published writings of staff members (*Jour. Arnold Arb.* 20: 459-462) comprises 85 individual papers with about 1,400 printed pages.

#### ATKINS INSTITUTION

At the Atkins Institution of the Arnold Arboretum, Soledad, Cienfuegos, Cuba, the most important item has been the consummation of an agreement with the Soledad Sugar Company fixing the ultimate area of the garden. The new boundary lines were established in February, 1939, the definite garden area on the basis of a new survey being 221.63 acres. This enables us to plan for the permanent location of study groups. The second important item was the construction of a new house with dormitory facilities for eight individuals and two private rooms that will accommodate four more, which will make a much greater use of the garden possible. Casa Catalina, a permanent concrete building overlooking the garden, the valley, and the mountains beyond, was so named in honor of Mrs. Edwin F. Atkins, who contributed \$1,500 to the cost of its construction, the balance, \$1,837, being generously provided by Dr. T. Barbour, Custodian. These additional housing facilities will enable us to invite representatives of other institutions in the United States and elsewhere to take advantage of the research facilities available at the Atkins Institution and thus extend its influence and productivity.

Numerous changes have been made in the plantings, the older ones have been extended and new ones developed. The number of species in cultivation constantly increases. As a part of its service to Cuban horticulture and botany 442 living plants and 113 packages of seeds were distributed, while 67 packages of cuttings and 556 packages of seeds were received.

A number of investigators, including the usual quota of graduate students from Harvard University, were in residence at Harvard House for varying periods of time, the number tending to increase from year to year, partly because of better transportation facilities now available, partly because the facilities for research on various tropical biologic problems become better known now that we are in a position to provide suitable living quarters for a larger number of

individuals. A complete report of the scientific activities of the Institution since Harvard House was constructed and a general resume of Garden history since its inception thirty-five years ago is in process of preparation.

E. D. MERRILL, Director