



**Annual Report 1940-1941**

TO THE PRESIDENT OF THE UNIVERSITY:

SIR,

In spite of unsettled economic conditions due to the European war, the Arnold Arboretum is still the fortunate recipient of important and extensive extra-budgetary support from numerous individuals interested in the institution and its work. Unrestricted gifts to the Cultural Purposes Fund amounted to \$7,382 from 357 individuals. Special contributions of \$1,600 were made to the George B. Emerson Fellowships, bringing the total to date for these fellowships to \$5,125. Through the generosity of Mr. John S. Ames, a member of our Visiting Committee, \$2,500 was provided for the purchase of that part of the Rowe Contracting Company's old quarry site on the Arboretum side of Centre Street. This is a timely gift that will, in the not distant future, enable us to eliminate an unsightly spot adjoining the Arboretum on its most extensively travelled approach. During the year the permanent endowment funds were increased by the receipt of \$23,054.90 from the estate of Mrs. Caroline S. Freeman, to be added to the Laura Lucretia Case fund. Five thousand dollars was presented by Professor James R. Jewett, under the conditions that from the income the James R. Jewett and Vieno T. Johnson prizes may be awarded annually by the Arnold Arboretum to individuals who have made noteworthy contributions to the improvement of our native beach plum and other native and introduced fruits. One thousand six hundred seventy-three dollars and seventy-seven cents was added to the principal of two special endowment funds in accordance with the original terms of gift appertaining to the original James Arnold fund and the Charles Sprague Sargent bequest.

The most serious situation that faces the institution at present is the very badly overcrowded conditions of the library and especially the herbarium, and there is little chance of expansion on the basis of available space in the present administration building. For several years past, temporary expedients have been adopted, and shifts in the sequences of both books and herbarium material made, until the possibilities on the basis of present floor space are about exhausted. As noted in the herbarium report below, no further general distributions of reference material into the herbarium are possible, because of the already overcrowded condition of the herbarium cases. It was hoped that this overcrowded condition might be met by the construction of a major building to take the three large botanical libraries and herbaria belonging to Harvard University, the combined collections of the Gray Herbarium, the Arnold Arboretum, and the Farlow Reference Library and Herbarium. To the library resources of these units the extraordinary library facilities of the Museum of Comparative Zoology might be added, thus forming one comprehensive biological library to serve all the biological units of the University, to replace the four large independent libraries now being maintained. This would be

a major move, but unfortunately there seems to be little chance of its being consummated for financial reasons.

[Professor Alfred Rehder](#), Curator of the Herbarium, retired on August 30, 1940, as Associate Professor Emeritus, having reached the age of 75 years, and Dr. J. H. Faull, in charge of Plant Pathology, became Professor Emeritus on the same date. Both individuals served the institution with distinction, the former for a period of forty-two years, and the latter for twelve years. Because of certain adjustments that it was most desirable to make in connection with the genetics situation, it has unfortunately not been possible, as yet, to make a replacement appointment in plant pathology. Professor Rehder continues to occupy his old desk, working on special botanical and nomenclatural problems but concentrating on the preparation of a bibliographical supplement to his *Manual of Cultivated Trees and Shrubs*. Dr. A. C. Smith of the New York Botanical Garden staff reported for duty as Curator of the Herbarium on October 1, 1940, succeeding Professor Rehder.

The widening of Bussey Street between the Arboretum proper and the Peters Hill section has been completed by the Park Department, while current repairs have been made to road-surfaces, walks, and benches. The dry season characteristic of the late summer and early fall of 1939 resulted in a considerable amount of winter injury to certain shrubs, but losses were negligible. The task of preparing the detailed planting maps initiated several years ago has been completed, there now being on file 101 completed panels showing the exact positions of all planted trees and shrubs within the Arboretum limits. In checking the maps, which also involved a critical re-identification of many of the planted species, it is revealed that there are now in actual cultivation at the Arnold Arboretum approximately 6,500 named species and varieties of hardy ligneous plants.

During the winter, 3,400 display labels were prepared and the majority of these were placed in position in the spring. A new type of direction sign has been designed with the lettering machine carved. Thirty-one of these were prepared and installed during the year.

Through the generosity of Mr. John S. Ames, the Arboretum has fortunately been able to acquire that part of the old quarry site on Centre Street formerly owned by the Rowe Contracting Company. This small triangle situated on the south side of Centre Street, and bounded on one side by Bussey Street, but separated from the Arboretum property by the abandoned right of way of old Centre Street, has long been more or less an eye sore, marring the approaches to the Arboretum. This was the last piece of privately-owned property on the Arboretum side of Centre Street, and it is now naturally pleasing to the Arboretum authorities and the Park Department that it has been acquired for Arboretum purposes.

During the spring planting season, 389 different species and varieties were added to the permanent collections by transfer from the nursery. Two hundred seven selected *Malus* and *Prunus* hybrids were planted on the Walter Street tract, while on certain hurricane devastated areas, 250 hemlocks, 50 white pines, and 40 red pines were placed.

The total number of living plants received from institutions in the United States, England, Canada, Hawaii, and Sumatra, was 1,500. At the same time, 69 lots of scions were received for propagation work, and 107 packets of seeds, selected from the larger number

received, were actually planted in the greenhouse. At the same time 4,516 living plants were distributed, 438 lots of scions and 1,103 packets of seeds, this material going to various parts of the United States and Canada, Cuba, Australia, Great Britain and Hungary. From the Yunnan seed accessions, Lu-Shan Botanic Garden and the Fan Memorial Institute Yunnan Expeditions, 476 packets of seeds were distributed to various institutions.

A serious attempt is made to keep the interested public posted on the attractions of the Arboretum and the services it renders. Through articles in the daily press, in weekly and monthly magazines, and in [\*Arnoldia\*](#) (the new name of our *Bulletin of Popular Information*), and by illustrated lectures to special groups of horticulturally minded people, the more popular and practical phases of the institutional work are presented, and the value of these activities is reflected by the constantly increasing demands on the Arboretum for material, advice, and assistance, resulting in an ever increasing heavy burden of correspondence.

The plant breeding program has been continued with species hybridization in lilacs, apples, cherries, azaleas and roses. Second-generation progeny of some of the species hybrids are being grown to provide a wide variety of new types for selection. Naturally cross pollinated species also have provided natural hybrids. Several thousand species hybrids are growing in the propagating beds and nurseries.

The work on X-ray effects has been continued during the past winter. It was found that irradiation had no effect on subsequent X-ray sensitivity. The exponents of dosage curve equations for complex chromosomal aberrations varies from 1 to 2 depending on X-ray intensity.

Supplementing the work in genetics as prosecuted in the past few years, the appointment of Dr. P. C. Mangelsdorf on the staff of the Botanical Museum, since it is financed in part by Arnold Arboretum funds, has enabled us to take part in his extensive corn breeding work, a part of this being centered at the Atkins Institution of the Arnold Arboretum at Soledad, Cienfuegos, Cuba, and apart in our own experimental grounds.

Seven hundred eighty-nine microscopic slides of wood sections were added to the reference collections, making a total of 24,382 available for study, representing 7,065 species. From various sources, 538 wood specimens were received, forming important additions to this large collection. The totals are now 5,278 species represented by 9,324 individual collections (preserved material) and 5,959 represented by 11,857 specimens (dried material). In the Icacinaceae project Professor Bailey and Mr. Howard have continued their anatomical studies, and their work has been supplemented by a study of the pollen characters by Dr. Dahl and of the trichomes and crystals by Mr. Heintzelman. Dr. Heimsch has concluded an extensive study of the comparative anatomy of the secondary xylem of the Geraniales and the Sapindales, Mr. Reed has initiated a comparative study of the Olacales and Santalales.

During the year 19,413 mounted specimens were inserted into the herbarium. A total of 26,770 specimens was mounted, some of these being ready for insertion and others being still under study. The total number of specimens now filed in the herbarium is 513,880.

The number of specimens (including duplicates) received by exchange, gift, subsidy, purchase, or for identification was 94,474. Of these, 42,591 are from North and South America, 23,232 from India and Indo-China, 12,058 from Polynesia, 10,635 from China, 2,936 from Malaysia, 1,050 from Papuasias, and 1,972 from Africa, the Philippines, Japan and Australia. Important American collections received were 5,126 specimens collected by Donovan Correll in Louisiana, about 8,300 specimens collected by J. W. Thompson in western North America, about 3,000 specimens collected by G. Martinez-Calderon in Mexico, 3,247 specimens sent by the Universidad Nacional de Tucuman, Argentina, and about 2,000 specimens collected by Verne Grant in Central America. Dr. I. M. Johnston's summer campaign in northern Mexico resulted in his securing about 6,000 specimens. Important Asiatic collections received were about 22,000 specimens (including duplicates) collected in Indo-China by W. T. Tsang (with the cooperation of Lingnan University), about 4,500 specimens collected by T. T. Yii in Yunnan, about 2,000 specimens from western China sent by the Lu-Shan Botanical Garden, about 2,500 specimens from Szechuan, China, sent by Nanking University, and about 12,000 specimens (including duplicates) collected in Fiji by Otto Degener (during the Pacific cruise of the "Cheng Ho" sponsored by Mrs. Anne Archbold).

The total number of specimens distributed by the Arboretum was 42,445, of which 40,497 went to American institutions. Of these, 32,253 were sent in continuation of exchanges, 4,591 as gifts, and 2,161 for identification by specialists. To the Gray Herbarium 10,769 specimens and 1,130 mounted illustrations accompanying descriptions were transferred, while 3,119 specimens of cellular cryptogams were transferred to the Farlow Herbarium and 504 specimens of orchids and numerous orchid descriptions and illustrations were sent to the Ames Orchid Herbarium at the Botanical Museum. To foreign institutions 1,948 specimens were sent, while books to the equivalent value of 4,146 specimens were exchanged under a special arrangement. Thus the total number of specimens, or their equivalent, sent out was 47,721. In addition, many thousands of specimens were packed and stored for shipment to European institutions as soon as conditions permit.

Thirty-three loans, totalling 1,275 specimens, were made to 16 American institutions. For study by staff members, 89 loans with a total of 8,142 specimens were received from 28 institutions, for the most part American.

Members of the herbarium staff continued study in their special fields, with the result that numerous manuscripts were prepared for publication and many thousands of routine determinations made. [Professor Rehder](#), who retired from active duty at the end of August, 1940, continued to visit the herbarium daily and to work on a bibliographical supplement to his *Manual of Cultivated Trees and Shrubs*. Dr. Smith, taking up his duties on October 1, 1940, studied special families of the Arboretum's extensive Papuasian collections, and undertook

preliminary work on the Degener Fijian collection. Dr. Johnston, aided by a grant from the Milton Fund, continued his cooperation with the Carnegie Institution. His summer field work in northern Coahuila, Mexico, was eminently successful. In addition to extensive work on his own collections, he has continued his identification work on Boraginaceae sent to him by numerous correspondents for study, and has continued the work of identification of the large collections obtained by Professor T. H. Goodspeed of the University of California and his associates in the arid parts of Chile and Peru. [Dr. Raup](#) continued his studies of the flora of Arctic America by preparing a report on his MacKenzie Mountains expedition collections of 1939. During the year he has ordered up the very extensive herbarium collections of North American Salix, determining several hundred specimens. Through a study of 1,054 specimens from the Peace and Upper Liard River regions sent to him by eight collectors and correspondents, he has added 227 species to his published catalogue of the plants of these regions. Dr. Kobuski has continued his studies of the *Theaceae*, giving special attention to the American genera. [Mr. Palmer](#) has continued his studies of western American plants and his collections of cultivated plants in the Arboretum. Dr. Allen has extended her work on the *Lauraceae* of the Old World and especially of *Papuasia*, also making numerous determinations in the genus *Halenia* in America. Dr. Perry has continued to study the extensive series of New Guinea plants received from the Richard Archbold Expeditions and other sources. Dr. Croizat has studied many genera of the Euphorbiaceae, extending his work on this difficult family. Under my supervision, Miss Luetta Chen has continued her study of the genera *Ormosia* and *Sabia*, while Mr. H. L. Li has commenced a study of the Chinese species of *Araliaceae*. Professor F. P. Metcalf of Lingnan University, with the aid of a Guggenheim Foundation Fellowship, worked at the Arboretum throughout the year in continuation of his work on the Flora of Fukien Province, China. My own work was largely concentrated on the preparation of a comprehensive report on the Captain F. Kingdon Ward collections from Upper Burma (Vernay Cutting Expedition), a study of the accumulated Indo-China material and certain groups of our very extensive and as yet unnamed Chinese collections, the determinations of various Philippine collections, and other accumulations from India, Burma, and Malaysia.

Aside from the work in Mexico prosecuted by Dr. I. M. Johnston, mentioned above, and which will be continued during the summer of 1941, our field work has been largely prosecuted through the granting of modest subsidies to individuals in various countries to enable them to undertake botanical exploration for the Arnold Arboretum. Grants were made during the past year to Sefior Guadalupe Martinez-Calderon for work in Oaxaca, Mexico, Mr. Otto Degener for work in Fiji, Mr. Robert L. Pendleton for work in Thailand, Mr. E. E. Smith for work in Colombia, Mr. J. W. Thompson for work in the Puget Sound region, Mr. James H. Soper for work in Ontario, Dr. T. H. Goodspeed for work in South America, and the National Szechuan University for work in western China. The continued unsettled conditions in China have interfered with the transmission of collections from the field, but extensive collections made in previous years are in safe storage in western China, while certain most important collections were delivered safely, especially the very large Indo-China collections, some 2,800 numbers, with extensive

duplicates, made in cooperation with Lingnan University. In Cuba, extensive summer collecting was done by Messrs. Dahl, Howard, Godfrey, and Hodge, the former a staff member of the Division of Biology, the last three graduate students in botany, through assistance and fellowship awards through the Atkins Institution of the Arnold Arboretum.

The extent of the library in bound volumes at the end of the fiscal year was 44,812, in unbound volumes several hundred; in pamphlets 12,957; in photographs 18,662; and in nursery catalogues several thousand; representing a net increase for the year of 306 bound volumes, 231 pamphlets and 18 photographs. There were added to the catalogue 1,130 cards, 530 of them containing bibliographical data, and 1,036 slips were added to the files which continue the printed author and subject catalogues of the library. Sixteen new periodicals were acquired and several new exchanges of publications arranged. Many books have been sent out on interlibrary loans, and the requests for microfilms and photostats have been more numerous than in previous years. James H. and Ralph Lowell made a gift of 33 books, totalling in value about \$700, in memory of their father, John Lowell, Harvard 1877. One of our rarest folios, Thornton's "*Temple of Flora*," was requested as a special loan by the R. H. Macy Company of New York City, for the purpose of reproducing four of its colored plates for sale.

The usual numbers of our technical Journal were issued, while the somewhat cumbersome title of our *Bulletin of Popular Information* was changed to *Arnoldia*, thus honoring the individual whose initial bequest led to the establishment of this, the first Arboretum in America. We now face difficulties in providing space for articles that should be published by the institution in spite of the fact that the size of the *Journal* has been increased from an average of about 450 to over 600 pages. As in past years the official periodicals reflect only in part the actual publishing activities of the staff. A detailed bibliography of about eighty items, approximately 1,658 pages, appears in the *Journal of the Arnold Arboretum* 22: 594-597, 1941.

#### ATKINS INSTITUTION

In the planting expansion program a number of palms were moved into the palm section, and several hundred shrubs and trees were transplanted into the newly acquired areas. In the additional area transferred to the garden in February 1939 by the Soledad Sugar Company, the last cane crop has been harvested, so that all the land is now available for planting and development. It has been necessary to extend the nursery area, and Dr. Mangelsdorf's tropical American corn varieties being grown at Soledad have required the preparation of land for this purpose. During the year 340 packets of seeds and 759 living plants were received and 433 packets of seeds, 46 living plants, and 53 lots of cuttings were distributed. Mr. Sturrock's book on tropical fruits for southern Florida and Cuba and their uses was published through the cooperation of the Arnold Arboretum in 1940, the income from sales being impounded for the use of the Atkins Institution. About forty individuals enjoyed the hospitality of Harvard House for varying periods of time, the most that have taken advantage of the facilities available in any one year since the institution was organized. These included fourteen representatives of

Harvard University working on various botanical and zoological problems. Other educational institutions represented include Wilson College, the University of Colorado, the University of Ohio, Skidmore College, the University of Montreal, Colegio de la Salle, and the University of Havana. Other institutions and organizations represented were the Fairchild Tropical Garden, the New York Botanical Garden, Montreal Botanical Garden, the Cleveland Museum of Natural History, the Ohio Division of Plant Industry, United Fruit Company, and the Cuban Agricultural Experiment Station. Among the Harvard staff members and students were Messrs. Gunckel, Salvin, Dahl, Howard, Hodge, and Godfrey, who spent extended periods in the summer of 1940 working on various botanical problems, and Messrs. Dethier and Greenway, who were prosecuting zoological work. An extensive series of botanical specimens representing Cuban species was presented by Mr. José Carabia. The comprehensive collecting campaign initiated by Messrs. Dahl, Howard, Godfrey, and Hodge in the summer of 1940 will be continued during the summer of 1941, the objective being to secure the material on which a reasonably comprehensive flora of southern Santa Clara Province may be based.

During the year the Atkins Institution was the fortunate recipient of gifts totalling \$4,426.68 for current expenses and special work, of which \$2,200 was an anonymous gift to provide for the reconstruction and enlargement of the greenhouse and neighboring lath house, and for the construction of a public shelter house connecting these two units. Mrs. Edwin F. Atkins provided \$1,000 for expenses of visiting students and investigators, and \$190 for an additional steel herbarium case, while Dr. Thomas Barbour provided \$836.08, of which \$300 was for student assistance, the balance for general expenses.

E. D. MERRILL, Director