



## Annual Report 1932-1933

TO THE PRESIDENT OF THE UNIVERSITY:

SIR,

I have the honor to present my seventh annual report on the condition and progress of the Arnold Arboretum. This report covers the year ending June 30, 1933.

With the exception of a heavy fall of snow in late February, the weather was favorable during the year. The damage caused by snow was chiefly confined to the junipers, spruces and small deciduous trees.

On [Hemlock Hill](#) there is evidence that the older hemlocks are suffering through the washing away of top soil and through the effects of recent droughts. Mr. Richard T. Fisher, Director of the Harvard Forest, has studied the conditions on Hemlock Hill and we hope to be able to follow his suggestions either wholly or in part with regard to remedial treatment.

Throughout the flowering season of the Japanese cherries, lilacs and rhododendrons, more visitors than ever before came to enjoy and study these collections. Notwithstanding the constantly increasing number of people who visit the Arboretum, the injuries to trees and shrubs caused by vandalism and simple thoughtlessness are surprisingly slight and perhaps more exasperating than harmful.

To establishments and correspondents, there have been sent out, as exchanges, cuttings, scions and plants representing 3,011 species and varieties and 817 packets of seeds. The number of cuttings, scions and plants received from all sources represents 1,714 different species and varieties. From establishments and correspondents in the United States and twenty-one other countries, we received packets of seeds representing 1,091 species and varieties.

The Herbarium, having been increased in 1932-1933 by the addition of 16,377 specimens, now contains 374,880 sheets of mounted plants. The rapid increase in the organized portion of the Herbarium is of course gratifying, and should the present rate of increase be maintained, it will soon be necessary seriously to consider a substantial addition to the Administration Building.

Botanical exploration, partly or wholly financed by the Arboretum, has continued to be one of the most prolific and satisfactory sources of new material. The policy of contributing toward the support of expeditions organized by Chinese institutions has been continued. At the present time we are cooperating with the University of Nanking in the exploration of the southern province of Kwangsi and by an arrangement made with the Fan Memorial Institute of

Biology we have been taking part since the spring of 1932 in an expedition to the less well known regions of Yunan. We are also cooperating with the Academy of Science of Western China in botanical exploration of Szechuan.

In addition to explorations in China, the Arboretum undertook collecting in the Solomon Islands. [Mr. L. J. Brass](#), who represented us there between July, 1932, and January, 1933, is now collecting for the Arboretum in New Guinea as a member of the Archbold Expedition. In April, May and June, 1932, Professor J. Bornmuller of Weimar made a successful collecting trip to Tripoli, Sicily and southern Italy, being financed in part by the Arboretum.

Members of the Staff, either through field work or visits to European herbaria, have assisted materially in obtaining valuable collections. Dr. Hugh M. Raup spent the summer in British Columbia and Alberta, where he collected 6,386 dried specimens representing 555 species and varieties, 36 samples of wood and many flowers and fruits in liquid preservative. As Dr. Raup's purpose was to correlate floristic and ecological points of view through studies of the little known flora of the Peace River region and to supplement the results obtained on five other expeditions to northwestern Canada, his collections of 1932 have deep significance.

[Professor John George Jack](#) spent about two months at the Atkins Institute of the Arnold Arboretum in Cuba working to increase the representation of Cuban woody plants in the Institution's garden. He collected for the Herbarium about 600 numbered specimens, accompanied by duplicates with samples of wood and fruit.

[Mr. Alfred Rehder](#), Curator of the Herbarium, spent the summer of 1932 in Europe continuing his investigations on the type specimens of Chinese plants preserved in European herbaria. He made about 600 photographs of types and critical specimens in the herbaria at Kew, London, Berlin, Florence, Paris and Geneva and obtained many rare specimens including fragments of precious types.

Dr. Ivan Murray Johnston, aided by a fellowship of the Guggenheim Foundation, departed in October to spend about a year among the botanical institutions in Europe. As stated in my report for 1931-1932, it was originally planned that Dr. Johnston should carry on part of his research work in Chile, but the political situation in Chile was unsettled in October and it was decided to postpone until later the work to be done there. Dr. Johnston has not only made profitable use of his time in research but he has secured for the Herbarium many specimens of critical importance and has made arrangements for extraordinarily advantageous exchanges.

Mr. J. B. Edwards continued his explorations in the Republic of Honduras, a part of Central America which is still very inadequately known botanically.

There have been sent out as exchanges to institutions in the United States, Canada, Europe, Asia, Africa and Australia 14,536 herbarium specimens.

Noteworthy among accessions has been a collection of 900 specimens comprising 18 fascicles of the *Herbarium Florae Rossicae* from the Botanical Institute in Leningrad.

The department of Phytopathology through Professor Faull, who is in charge of investigations, and through graduate students who are working on special problems, has made substantial progress. This department is in close association with the owners of large estates and gardens and is giving concentrated attention to the problems that arise in connection with the diseases of ornamental plants. Professor Faull has pushed forward with his studies of the rust fungi that attack coniferous trees and for the genus *Milesia*, a rust alternating between firs and ferns, has published a monograph of exceptional interest and importance. In this monograph, in addition to adjusting a much involved nomenclature and describing thirteen new species, he has clarified for the first time the life histories of three species of the nine whose life cycles are now more or less completely known.

Dr. K. S. Chester, who was a candidate for the degree of Ph.D. from the Pathological Laboratory in 1932, spent nine months in Europe with the aid of a Sheldon Travelling Fellowship. For seven months he worked in the laboratories of Professor Ernst Gaumann, devoting his attention to the subject of bacteriophage in relation to phytopathogenic bacteria. On his return to the Arboretum in June, 1933, he prepared a manual of the diseases and pests of the lilac. He will leave the Arboretum next year to accept an invitation to join the Department of Animal and Plant Pathology of the Rockefeller Institute of Medical Research.

Dr. John Ehrlich, who was a candidate for the degree of Ph.D. from the Pathological Laboratory in 1933, has brought to a conclusion his preliminary studies of the "beech bark disease" and will spend several months in Europe supported by a National Research Fellowship.

While abroad he will study the "beech bark disease" at its original sources. Mr. I. H. Crowell has completed two years of intensive investigation on the Gymnosporangium rust diseases of Juniperus. This investigation, partly supported by Dr. and Mrs. Henry Lyman, has proved extraordinarily fruitful, and it is hoped that Mr. Crowell will be able to carry on further studies in China, where certain phases of his subject may best be observed.

Mr. A. B. Hatch has undertaken studies on the mycorrhizae of pines, making a notable contribution to the technique employed in the investigation of the biology of these remarkable structures. His investigations have been made possible through the cooperation of the Arboretum, the Harvard Forest and an anonymous friend.

Miss L. M. Hunter, whose researches connected with the spermogonium of coniferous rusts are well advanced, will continue her work in Europe during 1933-1934, supported by a travelling fellowship.

Three years ago an alarming disease of the elm made its appearance in Cleveland and Cincinnati. Dr. Christine Buisman, who was at this time associated with our Pathological Laboratory, identified this disease as being referable to the Dutch Elm disease of Europe. The

cases discovered were promptly extirpated and it was hoped that the danger of recurrence had been removed. But this year an outbreak in New Jersey and southern New York has again directed attention to this disease and to the dangers to the American Elm, one of the most highly susceptible hosts. The Arboretum, through the Pathological Laboratory, is deeply interested in this Dutch Elm disease and will participate in efforts to control its spread while studying means for its elimination.

Cytological investigations have included a study of the mechanism of chromosome pairing and division together with an analysis of different families and genera with regard to relationships and origins. An analysis of the mechanism of crossing over was presented by [Professor Karl Sax](#) before the International Genetics Congress. This analysis will appear in the Proceedings.

Dr. Dermen's work on the origin and behavior of the nucleolus was brought to completion and the results of his research incorporated in a thesis offered in partial fulfillment of the requirements for the Doctorate. The cytological work on generic and specific relationships has been completed for *Yucca* and *Agave*, *Ulmus*, *Cornus*, *Acer*, *Magnolia* and several conifers. *Yucca* and *Agave*, taxonomically regarded as genera belonging to distinct monocotyledonous groups, have been shown to be closely related and not so widely separated as the traditional evidence for estimating their botanical affinity would seem to indicate. That the taxonomic evidence based on chromosomes is in large measure reliable is proved by observations made on *Cornus*, *Ulmus*, *Celtis* and *Magnolia*. In the conifers most of the genera are different in the morphology of their chromosomes, but species within each genus have similar genomes.

Breeding work with *Roses*, *Lilies* and conifers has been continued and several crosses between different genera of the *Pomoideae* appear to have been successful. It is still too early to report on the results of breeding work as the progeny of most of the plants that have been used in crossing require several years to reach flowering and fruiting age.

Professor Irving W. Bailey spent the summer in California engaged in research work on the chemistry of woods at the Palo Alto Biological Laboratory of the Carnegie Institution.

The Library at the end of June, 1933, contained 40,919 bound volumes, 10,085 pamphlets and 16,895 photographs. The gain in the number of volumes added to the shelves in the organized collections shows a decline from the year ending June 30, 1932. This decline is the result of economies forced on us by the diminution of the income from special funds, the shrinkage in unrestricted income and the smaller number of books sent to the bindery. The present policy is to purchase only such books as are called for by the Staff and to confine our general purchases to books that are currently issued or have direct bearing on woody plants. Old books that have a purely historical value and would simply round out the collection of herbals and pre-Linnean literature have been neglected in our recent purchases.

[The Journal of the Arnold Arboretum](#) was issued quarterly and the *Bulletin of Popular Information* was issued with customary regularity.

Of the four hundred periodicals received by the Library nearly 250 come to us in exchange for the *Journal* and *Bulletin*. Three numbers of the Contributions appeared in the course of the year, and two editions of the *Forest Trees of New England* were printed. The first edition of the *Forest Trees of New England* was exhausted shortly after publication and the second edition was selling rapidly as the year closed.

The published papers of the staff and graduate students for the year 1932-1933 amounted to approximately 800 pages. The bibliography appended to this report reveals the broad scope of our interests. I direct your attention to this bibliography as it indicates that the Arnold Arboretum is serving the practical needs of horticulture and arboriculture while contributing substantially to the advancement of science.

#### THE ATKINS INSTITUTION OF THE ARNOLD ARBORETUM

The unsettled conditions in Cuba have had a restraining influence on scientific activities at the tropical garden and laboratory near Cienfuegos.

Professors East and Sax spent the month of February at Harvard House, where they assembled material for cytological research. In April Dr. Barbour and David Fairchild visited the garden and in July Dr. Barbour made a second visit.

Mr. Frank Gordon Willingham, a man who has had extensive horticultural training in England and Florida, joined the staff as Assistant Superintendent. In addition to routine work he made a trip to Jamaica for the purpose of assembling and shipping to Cuba a large collection of plants presented to us by the authorities in charge at Hope and Castleton gardens.

By a most advantageous arrangement we have received from the Club Azucarero de Cuba their entire library, herbarium, collection of soil samples, microscopes and reagents--constituting the equipment formerly used at the research laboratory at Baragua. This equipment is being loaned to us for three years, when it will become the property of Harvard University unless in the meantime the research laboratory of the Club Azucarero de Cuba is reopened.

Robert M. Grey, Superintendent, and Mr. F. Tracy Hubbard, Assistant in the Botanical Museum, completed their work on the List of Plants growing in the Botanical Garden of the Atkins Institution of the Arnold Arboretum. This work was printed by the Harvard University Press and published early in 1933. In the list of plants, 1,970 species belonging to 921 genera and 165 families are shown to comprise the organized flora of the garden.

The Arboretum is now in intimate relation with the rest of the University. Five members of the staff offer courses under the Department of Botany, covering the subjects of cytology, plant anatomy, economic botany, phytopathology and taxonomy. Furthermore the Division of Biology has set aside laboratory space for our phytopathological department in the new Biological Building in Cambridge. Four members of the Arboretum staff are associated with the

Harvard Forest and between the two institutions there is a spirit of harmony and cooperation that is fruitful. Also the relations between the Arboretum and the [Bussey Institution of Applied Biology](#) are pleasantly close. Members of our Staff are assigned laboratory space in the Bussey Building and our pathological laboratory and greenhouse and the propagating department and nursery are on land belonging to the Bussey Institution.

Early in the year two large gifts were received. One of these, made in September, 1932, was mentioned in my last report. This was a gift of fifty thousand dollars from Miss Isabella M. Cowell to establish the Mr. & Mrs. Henry E. Cowell Fund. In November, 1932, Miss Cowell gave an additional fifty thousand dollars to establish the Helen E. Cowell Fund. The income from these funds is unrestricted.

The Arnold Arboretum has indeed been fortunate. But to carry on the work before us we must look to our friends for additional financial assistance. One of the most pressing needs at this time is a fire-proof addition to the Administration Building to protect the precious library and to free space in the Herbarium that is now used for the overflow of books. It cannot be too often emphasized that the irreplaceable library of the Arboretum is in danger of serious damage or extinction should fire break out because the part of the Administration Building devoted to the Library is not even of slow burning construction and the floors and book shelves are of wood.

OAKES AMES, Supervisor.

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