



Annual Report 1933-1934

TO THE PRESIDENT OF THE UNIVERSITY:

SIR,

I have the honor to submit my eighth annual report on the progress and activities of the Arnold Arboretum. This report covers the year ending June 30, 1934.

The winter of 1933-1934 proved exceptionally severe in New England. Cold weather began in November and on November 11 about an inch of snow fell at a time when many of the trees and shrubs in the Arboretum were still leafy. From November to March there were many days of extreme cold. February was the coldest month ever recorded in Massachusetts by the Weather Bureau. In addition to low temperatures the wind was of more than normal mean intensity. The severity of the winter was clearly revealed in the damage done to the collections of living plants. With the arrival of spring many species that had come to be regarded as hardy in the climate of Boston failed to show signs of life, and many others were killed to the ground. A careful survey of winter damage has been undertaken and the results of this survey will be published in the *Bulletin of Popular Information*.

From the Propagating department there were sent out to other botanical institutions 1,712 packets of seeds, 2,358 plants and 422 scions and cuttings. We received from institutions situated in the United States and in other parts of the world 1,105 packets of seeds, 1,286 plants and 35 cuttings and scions.

In 1919, as a consequence of the Plant Quarantine laws, efforts at plant introduction almost ceased, and in his annual report for 1921-1922 [Professor Sargent](#) stated that the introduction of new plants into the United States had been practically ended by the rulings of the Federal Horticultural Board. This was the situation in 1926 when I took over the administration of the Arboretum, and until 1934 no serious effort had been made to resume the introduction of living plants on a large scale, attention being concentrated on the development of new departments of research and on the establishment of a greater diversity of interests in existing departments. By 1934, however, it had become increasingly evident that the Arboretum should once again take part in plant introduction, and plans are now being made with this end in view.

[*The Journal of the Arnold Arboretum*](#) has been issued quarterly and has been devoted chiefly to papers written by members of the staff. The Bulletin of Popular Information appeared irregularly and in general followed the trend that has characterized it since 1931. Two numbers of the Contributions were published, the fifth number of the series being "The Flora of Barro Colorado Island, Panama. "This publication filled a long felt need and will be helpful to biologists who visit the laboratory on Barro Colorado Island. A supplement to the Library Catalogue was issued in 1933.

For the past twenty-five years the land surrounding the Arboretum has been developing for residential purposes at a faster rate than any other part of Boston, with the unfortunate result that the Arboretum has come to be regarded as a playground by the young people of the district. Skiing, coasting, skating and other sports are carried on within our gates. These sports have caused serious damage to the living collections. This winter 26 trees were destroyed in a plantation of young poplars; the shrub borders near the pond were injured by skaters, and young conifers suffered from the incautious use of skis. On one Sunday afternoon over 250 people were counted coasting and skiing in the apple and poplar collection. In the spring with the approval of the Chairman of the Park Commission, new regulations were prepared and posted in conspicuous places. These regulations forbid skating, skiing and coasting in the Arboretum. It is intended to discourage the use of the Arboretum as playground.

THE HERBARIUM

Since its inception in 1880, when it contained 1,073 unmounted plants, the Herbarium has developed consistently along the lines established by Professor Sargent, until to-day, with a total of 391,803 mounted specimens in the organized collection and a mass of unorganized material awaiting study, it is one of the great dendrological herbaria of the world, - in some of its departments unrivalled anywhere. In the year covered by this report 16,923 specimens have been added. The rapid growth of the Herbarium under the curatorship of Professor Rehder is evidence of the interest in systematic botany that characterizes our times, because accessions are chiefly the fruit of recent explorations in new fields and very rarely represent the purchase of old collections or the receipt of duplicates from other institutions. There is an evil aspect, however, in the good fortune that brings to the Arboretum from sixteen to twenty thousand specimens annually. I refer to the heavy burden of clerical work that has to be done by our highly trained specialists whose efforts and complete energy should be devoted to original investigation and to the preparation of critical monographic works. There is another evil in this situation. I refer to the duplication of specimens that comes about through the maintenance of two great herbaria in the University. Both of these herbaria are overcrowded and the vanishing of case-room portends a large expenditure of funds for new buildings if efficient storage of specimens is to be maintained.

To thirty-three institutions in different parts of the world we sent 20,140 herbarium specimens. These specimens were distributed for purposes of exchange, and in the course of time should bring to us a rich harvest of desirable accessions.

Botanical exploration by members of the Herbarium staff or by expeditions partly or wholly financed by the Arboretum has been carried forward in America, and in eastern Asia. Mr. Palmer collected in the southern United States, devoting his attention for the most part to the critical genus *Crataegus*. Mrs. Susan Delano McKelvey made a very successful expedition to Arizona and the southwest seeking species of *Yucca* in type localities. Dr. Raup gave his attention to the flora near the Harvard Forest, studying the development of the herbaceous plants that follow the cutting or thinning of timber stands. Mr. C. H. Mueller explored in northern Mexico, beginning in May. Mr. J. B. Edwards concluded his work in Honduras, where he has collected several thousand specimens in regions very little known botanically. In China we took part in three expeditions, one to Kwangsi, one to Hunan and a third to the island of Hainan.

In 1933 Dr. Johnston, aided by a Guggenheim Fellowship, spent about ten months in Europe working on phytogeographic problems, and studying intensively critical material of the Boraginaceae and Nolanaceae. Since his return to the Arboretum in October 1933 he has continued the preparation of papers on the Boraginaceae for Professor Pulle's Flora of Surinam; for a flora of Texas; for a flora of Southern California and for Abram's Illustrated Flora of the Pacific States. In 1934-35 Dr. Johnston will offer a course in systematic botany in the Division of Biology.

THE LIBRARY

Steady growth has been made by the Library although curtailment of purchases has been obligatory through a decrease in the funds available for books. Nevertheless, the additions to the organized collection are about equal to the additions of recent years. The policy in force is to supply the needs of the staff and to concentrate on the increase of the dendrological section. During the year 571 volumes, 400 pamphlets and 346 photographs were added to the organized library, making a total of 41,490 bound volumes, 10,485 pamphlets and 17,241 photographs on the shelves and in the files.

In an effort to avoid duplications, several periodicals that are to be found in other departments of the University were discontinued, and two periodicals, namely, *Gummi-und Asbest-zeitung*, volumes VII-XXXII, and *Gummi-Zeitung*, volumes XXII-XLVII, were transferred to the Baker Library at the Harvard Business School.

To relieve congestion four new steel stacks were added to the equipment of the fire-proof room on the fourth floor of the Herbarium section of the Administration Building, a room that is temporarily used for books.

In earlier reports I have referred to the urgent need of a fire-proof addition to the Administration Building to accommodate the Library and to remove the threat of destruction to priceless and irreplaceable books.

THE PHYTOPATHOLOGICAL LABORATORY

The department of Phytopathology performed many useful services to horticulture and arboriculture during the year and contributed to the increase of phytopathological knowledge through several important publications. This department, following the policy of former years, cooperated with state and city organizations in the study of devastating diseases of trees and maintained close relations with the owners of large estates in efforts to solve problems that have arisen in connection with the diseases of ornamental plants.

The Dutch elm disease since 1930, when it was discovered in the United States for the first time, has been closely watched by Professor Faull and preparations have been made to assist in controlling its spread. With financial assistance received from Mrs. Harold I. Pratt, we established a laboratory on Long Island in the spring of 1934 and assigned to Dr. D. B. Creager the work of investigating the outbreaks of the disease in southern New York. This disease has already reached Connecticut and unless success attends efforts at suppressing it, or checking its spread, it will invade Massachusetts in another year or two.

In addition to "Graphium wilt" (Dutch elm disease), two other serious wilts have been observed. One of these, an almost uninvestigated wilt, was found to be surprisingly prevalent and to be the cause of the formerly unexplained sickly condition of many elms on Long Island.

Dr. John Ehrlich's studies of a serious pathological condition of the American beech caused by a *Nectria* following attacks of an introduced insect, will be published jointly by the Arboretum and the Canadian Research Council. Dr. Ehrlich's paper will appear in the Contributions of the Arnold Arboretum and in the Canadian Journal of Research.

Dr. Ivan Crowell, who was a candidate for the degree of Doctor of Philosophy from the Pathological Laboratory in 1934, will leave us next year to accept a position with the Bartlett Tree Expert Company. He has completed a successful investigation of the hosts, life-history and control of the cedar-apple rust, a piece of research work that was supported by Dr. and Mrs. Henry Lyman. In the course of an exhaustive series of inoculations it was revealed that all American species of apple are susceptible and all apples of Eurasian origin with the exception of two highly resistant forms, are immune. A practical aspect of Dr. Crowell's work was the discovery that certain sulphur fungicides point the way to successful control of the rust without the elimination of either the apple or cedar host.

Other investigations by the Pathological Laboratory staff and graduate students have to do with the various diseases of conifers, the physiology of mycorrhizae and pseudomycorrhizae of pine; rust diseases of hawthorns and other pomaceous hosts; a physiological disease of the apple, and a monograph of *Uredinopsis*.

THE CYTOLOGICAL LABORATORY

Cytological investigations have been under the direction of Professor Sax, and have been devoted largely to a study of the behavior of chromosomes and the breeding of ornamental plants. *Tradescantia* chromosomes have been subjected to various temperatures and to X-rays with results that have been deeply significant. The cytological investigations of different groups of plants have been continued with special emphasis on the gymnosperms. Work in progress includes studies of the mechanism of development and differentiation, parthenogenesis and self-sterility.

Breeding work was curtailed this year through the influence of the severe winter on the flowering of the collections. It is hoped that in 1935-36 the hybrids obtained in earlier years will begin to bloom.

THE ATKINS INSTITUTION OF THE ARNOLD ARBORETUM

The climatic conditions during 1933-34 were favorable for the development of the botanic garden. More than 520 species and varieties have been added to the organized collection since January 1, including many new palms. The palm collection has been given careful attention as the study of this highly technical group can be most satisfactorily prosecuted with the aid of living specimens. We now have 225 species and varieties of palms under cultivation, about double the number represented in 1932, and it is our intention to increase the collection annually until all of the obtainable species adapted to the Cuban climate have been assembled. Over 600 packets of seeds and over 800 plants were received during the year. There were sent out to forty-seven gardens and experiment stations 700 packets of seeds and many plants and cuttings.

Labor troubles were prevalent at Cienfuegos and Soledad in September and threats of damage to the garden were made. Nothing serious came of these threats, but the so-called Labor-Syndicate with the approval of the Cuban Government forced us to establish a working week of forty-eight hours, a reduction of sixteen working-hours a week. The wage scale was also changed and by law the employment of fifty per cent native labor in every department was enforced.

In the summer of 1934 several members of the biological staff of the University will visit the Institution for research work in Botany and Zoology. Dr. Ivan Murray Johnston, Research Associate at the Arnold Arboretum, Dr. W. J. Clench and Dr. P. J. Darlington of the Museum of Comparative Zoology have planned to spend several weeks at Harvard House (the Laboratory and Dormitory of the Institution).

In closing this report I desire to record my thanks to the Visiting Committee for valuable suggestions and constructive criticism. The Arboretum finds itself "realizing its ideal of yesterday, though still pursuing eagerly its ideal for tomorrow."

OAKES AMES, Supervisor.

BIBLIOGRAPHY OF THE PUBLISHED WRITINGS OF THE STAFF AND STUDENTS,
JULY 1, 1933-JUNE 30, 1934

AMES, OAKES.

Friedrich Richard Rudolf Schlechter, 1872-1925. (In *American Orchid Society Bulletin*, 1933, ii, 21.)

A new *Bletia* from Mexico. By Oakes Ames and Charles Schweinfurth. (In *Harvard University, Botanical Museum Leaflets*, 1933, no. 10, pp.6-7.)

A new genus of the *Pleurothallidinae*. (In *Harvard University, Botanical Museum Leaflets*, 1933, no. 9, pp. 1-31.)

New or noteworthy Philippine orchids, iv. By Oakes Ames and Eduardo Quisumbing. (In *Philippine Journal of Science*, 1933, lii, 443-473.)

A new *Sobralia* from the republic of Honduras. (In *Harvard University, Botanical Museum Leaflets*, 1933, no. 10, pp. 1-5.)

A remarkable record for *Cypripedium parviflorum* var. *pubescens*. (In *American Orchid Society Bulletin*, 1933, ii, 27-28.)

Robert Allen Rolfe, 1855-1921. (In *American Orchid Society Bulletin*, 1933, ii, 39.)

A contribution to our knowledge of the orchids of Spanish Honduras. Pt.i. (In *Harvard University, Botanical Museum Leaflets*, 1934, ii, 73-84.)

Ernst Hugo Heinrich Pfitzer 1846-1906. (In *American Orchid Society Bulletin*, 1934, ii, 57-58.)

A new *Liparis* from Guatemala. By Oakes Ames and Charles Schweinfurth. (In *Harvard University, Botanical Museum Leaflets*, 1934, ii, 97-99.)

A new *Pleurothallis* from Honduras. (In *Harvard University, Botanical Museum Leaflets*, 1934, ii, 25-29.)

Notes on Philippine orchids. (In *Harvard University, Botanical Museum Leaflets*, 1934, ii, 31-32.)

Studies in *Stelis*. i, ii. (In *Harvard University, Botanical Museum Leaflets*, 1934, ii, 1-24, 85-95.)

Three polymorphic alliances in *Epidendrum*. By Oakes Ames, F. T. Hubbard and Charles Schweinfurth. (In *Harvard University, Botanical Museum Leaflets*, 1934, ii, 41-71.)

ANDERSON, EDGAR.

A comparative anatomical study of a mutant *Aquilegia*. (In *American Naturalist*, 1933, lxxvii, 380-384.)

A convenient color chart for geneticists. (In *Science*, 1933, lxxviii, 150151.)

Fothergilla major. (By) Edgar Anderson (and) W. H. Judd. (In *Arnold Arboretum Bulletin of Popular Information*, 1933, i, 61-64.)

Hydrangea petiolaris and *Schizophragma hydrangeoides*. (In *Arnold Arboretum Bulletin of Popular Information*, 1933, i, 53-56.)

Pterocarya Rehderiana. (In *Arnold Arboretum Bulletin of Popular Information*, 1933, i, 57-60.)

Variation in flower color in *Hamamelis vernalis*. (In *Journal of the Arnold Arboretum*, 1933, xiv, 253-257.)

A cytological analysis of self-sterility in *Tradescantia*. (By) Edgar Anderson and Karl Sax. (In *Botanical Gazette*, 1934, xcv, 609-621.)

The genus *Akebia*. (In *Arnold Arboretum Bulletin of Popular Information*, 1934, ii, 17-20.)

Hamamelis vernalis Sarg., the Ozark witch-hazel. (In *Arnold Arboretum Bulletin of Popular Information*, 1934, ii, 1-4.)

Hardy flowering cherries. (In *Arnold Arboretum Bulletin of Popular Information*, 1934, ii, 5-8.)

Hardy forsythias, with a short account of the history of garden forsythias and remarks regarding their possible future development. (In *Arnold Arboretum Bulletin of Popular Information*, 1934, ii, 9-14.)

Interlocking of bivalent chromosomes of *Tradescantia*. By Karl Sax and Edgar Anderson. (In *Genetics*, 1934, xix, 157-166.)

Origin of the angiosperms. (In *Nature*, 1934, cxxxiii, 462.)

Plants of current interest. (By) Edgar Anderson (and) L. V. Schmitt. (In *Arnold Arboretum Bulletin of Popular Information*, 1934, ii, 15-16.)

A quantitative comparison of specific and generic differences in the Betulaceae. (By) Edgar Anderson and E. C. Abbe. (In *Journal of the Arnold Arboretum*, 1934, xv, 43-49.)

Speciation in *Uvularia*. (By) Edgar Anderson and T. W. Whitaker. (In *Journal of the Arnold Arboretum*, 1934, xv, 28-42.)

BAILEY, IRVING WIDMER.

The cambium and its derivative tissues. viii. Structure, distribution, and diagnostic significance of vestured pits in dicotyledons. (In *Journal of the Arnold Arboretum*, 1933, xiv, 259-273.)

Glossary of terms used in describing woods. By Committee on nomenclature, A. J. Eames, I. W. Bailey, and others. (In *Tropical Woods*, 1933, xxxvi, 1-12.)

CHESTER, KENNETH STARR.

The problem of acquired physiological immunity in plants. (In *Quarterly Review of Biology*, 1933, viii, 129-154, 275-324.)

Studies on bacteriophage in relation to phytopathogenic bacteria. 1933. (In *Zentralblatt für Bakteriologie, Parasitenkunde und Infektionskrankheiten*, abt. 2, 1933-34, lxxxix, 1-30.)

Studies on the "precipitin reaction" in plants. v. Application to plant relationships. (By) K. S. Chester, E. C. Abbe, and P. A. Vestal. (In *Journal of the Arnold Arboretum*, 1933, xiv, 394-407.)

CROWELL, IVAN H.

Fungicidal control of *Gymnosporangium juniperi-virginianae* and related species. (In *Phytopathology*, 1934, xxiv, 5-6.)

Relative susceptibility of the species of *Malus* to *Gymnosporangium juniperi-virginianae*. (In *Phytopathology*, 1934, xxiv, 6.)

DERMEN, HAIG.

Origin and behavior of the nucleolus in plants. (In *Journal of the Arnold Arboretum*, 1933, xiv, 282-323.)

EHRlich, JOHN.

The beech bark disease; a necrotic disease of *Fagus* following *Cryptococcus fagi* (Baer.). (In *Canadian Journal of Research*, 1934, x, 593-692.)

FAULL, JOSEPH HORACE.

The biology of milesian rusts. (In *Journal of the Arnold Arboretum*, 1934, xv, 50-85.)

Blister rust of *Pinus longifolia* Roxb. [Review.] (In *Journal of the Arnold Arboretum*, 1934, xv, 154-157.)

A remarkable spruce rust, *Peridermium Parksianum*, n. sp. (In *Journal of the Arnold Arboretum*, 1934, xv, 86-87.)

Weymeyer's "The genus *Diaporthe* Nitschke and its segregates." (In *Journal of the Arnold Arboretum*, 1934, xv, 157-161.)

FOSTER, ROBERT C.

Chromosome number in *Acer* and *Staphylea*. (In *Journal of the Arnold Arboretum*, 1933, xiv, 386-393.)

HATCH, ALDEN BRUCE.

Some hymenomycetes forming mycorrhizae with *Pinus strobus* L. (By) A. B. Hatch (and) C. T. Hatch. (In *Journal of the Arnold Arboretum*, 1933, xiv, 324-334.)

Preliminary note on the relation of mycorrhizae to dry-weight increase in *Pinus strobus*. (In *Phytopathology*, 1934, xxiv, 10.)

JUDD, WILLIAM HENRY.

Fothergilla major. (By) Edgar Anderson (and) W. H. Judd. (In *Arnold Arboretum Bulletin of Popular Information*, 1933, i, 61-64.)

Severe weather at the Arnold Arboretum. (In *Gardeners' Chronicle*, 1934, xcv, 21, 37, 106, 140.)

PALMER, ERNEST JESSE.

American fern society. (In *American Fern Journal*, 1934, xxiii, 126-128.)

The beach plum in Michigan. (In *Journal of the Arnold Arboretum*, 1934, xv, 88.)

Notes on some plants of Oklahoma. (In *Journal of the Arnold Arboretum*, 1934, xv, 127-134.)

Quercus ellipsoidalis in Missouri. (In *Journal of the Arnold Arboretum*, 1934, xv, 89.)

RAUP, HUGH MILLER.

Notes on the distribution of white spruce and Banksian pine in northwestern Canada. (In *Journal of the Arnold Arboretum*, 1933, xiv, 335-344.)

A new species of *Euphrasia* from northwestern Canada. (In *Rhodora*, 1934, xxvi, 87-88.)

Phytogeographic studies in the Peace and Upper Liard River regions, Canada, with a catalogue of the vascular plants. (In *Contributions from the Arnold Arboretum of Harvard University*, 1934, vi.)

REHDER, ALFRED.

New species, varieties and combinations from the herbarium and the collections of the Arnold Arboretum. (In *Journal of the Arnold Arboretum*, 1933, xiv, 199-222, 345-350.)

Notes on the ligneous plants described by ~~Leveillé~~ from eastern Asia. (In *Journal of the Arnold Arboretum*, 1933-34, xiv, 223-252; xv, 1-27, 91117.)

Apios americana. (In *Rhodora*, 1934, xxxvi, 88-89.)

SAX, KARL.

The cytological mechanism for crossing over. (In *Proceedings of the 6th International Congress of Genetics*, 1932, i, 256-273.)

Chromosome behavior in *Calycanthus*. (In *Journal of the Arnold Arboretum*, 1933, xiv, 279-281.)

Chromosome number and morphology in the conifers. (By) Karl Sax and Hally J. Sax. (In *Journal of the Arnold Arboretum*, 1933, xiv, 356-375.)

Development of the male gametophyte in *Tradescantia*. (By) Karl Sax and H. W. Edmonds. (In *Botanical Gazette*, 1933, xcv, 156-163.)

The origin of the *Pomoideae*. (In *Proceedings of the American Society for Horticultural Science*, 1933, xxx, 147-150.)

Species hybrids in *Platanus* and *Campsis*. (In *Journal of the Arnold Arboretum*, 1933, xiv, 274-278.)

A cytological analysis of self-sterility in *Tradescantia*. (By) Edgar Anderson and Karl Sax. (In *Botanical Gazette*, 1934, xcv, 609-621.)

Interlocking as a "demonstration" of the occurrence of crossing over. (In *American Naturalist*, 1934, lxxviii, 95-96.)

Interlocking of bivalent chromosomes of *Tradescantia*. By Karl Sax and Edgar Anderson. (In *Genetics*, 1934, xix, 157-166.)

SCHMITT, LOUIS VICTOR.

Plants of current interest. (By) Edgar Anderson (and) L. V. Schmitt. (In *Arnold Arboretum Bulletin of Popular Information*, 1934, ii, 15-16.)

TUCKER, ETHELYN MARIA.

Catalogue of the Library of the Arnold Arboretum of Harvard University. Vol. iii. Serial publications - Authors and titles; supplement, 1917-1933. Cambridge. 1933.

WHELDEN, CHARLES MARSH.

Studies in the genus *Fraxinus*. i. A preliminary key to winter twigs for the sections *Melioides* and *Bumelioides*. (In *Journal of the Arnold Arboretum*, 1934, xv, 118-126.)

WHITAKER, THOMAS WALLACE.

Chromosome number and relationship in the *Magnoliales*. (In *Journal of the Arnold Arboretum*, 1933, xiv, 376-385.)

Chromosome constitution in certain monocotyledons. (In *Journal of the Arnold Arboretum*, 1934, xv, 135-143.)

Genetic and cytological research in the *Amaryllaceae*. (In *Year Book of the American Amaryllis Society*, 1934, i, 68-69.)

The occurrence of tumors on certain *Nicotiana* hybrids. (In *Journal of the Arnold Arboretum*, 1934, xv, 144-153.)

Speciation in *Uvularia*. (By) Edgar Anderson and T. W. Whitaker. (In *Journal of the Arnold Arboretum*, 1934, xv, 28-42.)