

ARNOLD ARBORETUM
HARVARD UNIVERSITY



BULLETIN
OF POPULAR INFORMATION

SERIES 4. VOL. VI

MAY 16, 1938

NUMBER 5

MAPPING THE ARBORETUM

AS THE number of living plants has increased in the Arboretum, the problem of locating individual species naturally has become more and more difficult. Many thousands of individual trees and shrubs representing over 7000 named species and varieties from the north temperate zone of both hemispheres are growing in the glades and on the hills within the Arboretum boundaries. A handy record is essential to locate them when access to a particular species or variety is needed for horticultural or botanical purposes.

The basic plant records of the Arboretum are kept in card index form. The data on the cards give the history of the plant, including its name, origin, date of acquisition, number and the general collection (e.g. maples, lindens, etc.) in which it is to be found. Such a record was adequate for its purpose as long as the collections were comparatively small and each staff member could have a thorough knowledge of the grounds. Experience eventually taught that a supplementary graphic record is absolutely necessary. Thousands of plants spread over 265 acres of widely diversified grounds cannot be exactly located by means of approximate references and brief descriptions.

One of the important projects recently initiated at the Arnold Arboretum has been the actual mapping of the positions of all the trees and shrubs in its extensive living collections. Prior to this time partial surveys had been made, and maps covering certain sections had been prepared which unfortunately were not kept up to date. The new and complete survey will involve between seventy and eighty maps, each measuring 2 by 2½ feet. The progress made in the last seven months indicates that the work will probably be finished by the end of the present calendar year.

Two scales are being used: $1'' : 20'$ and $1'' : 10'$, i.e. one inch to 20 feet and one inch to 10 feet. The $1'' : 10'$ maps are designed to show in detail the positions of all small plants or shrubs cultivated in congested areas, thus supplementing the standard ones. The scale $1'' : 20'$ is the standard adopted for the general maps where for the most part tree species are involved.

The instruments used in our work would not satisfy the requirements of the Coast and Geodetic Survey. They are essentially those which were available to George Washington in the days of his youth, that is, the magnetic compass, the alidade, and the chain. In their modern form these instruments are available in the standard K. & E. Traverse Table and in the usual 50 and 100 foot tapes. The alidade is the device that establishes a line of sight between two points. It has a fore slit, a back vertical thread, and a side ruler that is scaled, in our case to one inch for 40 feet. By putting the point to be "spotted" in line between the slit and the thread and scaling off its distance on the table, one determines its position and its distance from a station at which the instrument is set up. The distance between the station and the plant is actually measured, or, if it is inaccessible, determined by sighting the point from two or more different stations. The intersection of the lines of sight gives the location sought.

Crude as these instruments are, they are surprisingly accurate if the user has a definite understanding of their limitations. The normal rate of error is about one foot in one hundred, which is more than satisfactory for a survey of the type in which we are interested. Sufficient accuracy in the long range is assured by so called traverse lines that connect landmarks within property limits. The partial surveys are integrated on these traverse lines. Each partial survey shows the positions of three or more trees in each adjacent area. Thus it is possible to overlap the surveys on known points, singly and as a whole. The disadvantages inherent to this manner of field work are apparent to the professional surveyor. Its advantages for our particular work, however, are simplicity of operation and availability of record with a minimum amount of time and with limited personnel. About 180 acres were covered in sufficient detail to outline the main features of the maps and to locate the majority of trees in about ten weeks of actual operation. The use of precise instruments yields precise results, but involves exacting requirements. It is debatable as to whether or not the record secured by a regular survey would be more serviceable, cost considered, than that secured by use of the traverse table.

The field record taken at the scale of $1'' : 40'$ is assembled and reduced to the scale of $1'' : 20'$, or $1'' : 10'$. Each map covering an area



PLATE IV
An airplane view of the Arnold Arboretum.

400 by 600 feet is drawn on tracing cloth at the scale of 1":20'. From this master map a black and white print is made. This print is carefully checked in the field, the necessary revisions, corrections, and additions being then made. The changes are eventually transferred to the master tracing cloth map. When the field check is finished and the data all transferred, each master map is then divided by four intersecting lines that determine sections, or quadrants A, B, C, D. Lastly, the exact position of each plant is recorded on the index cards, references being added to the map number and to the quadrant. The card entry, *Acer negundo* 6 | B, for example, indicates that the corresponding plant is located on map 6, quadrant B. This establishes its position within a definitely located tract measuring only 200 by 300 feet.

Revisions of the master map will be made as changes in the plantings occur; that is as plants are moved, removed, or added. The necessary corrections will be entered on the prints in the field in connection with all future operations. Since each revision will be dated, the corrections will be transferred from the prints to the master maps only once or twice a year. Thus at a glance the record will tell whether or not the master map is up to date. If it is not, the print must be consulted. In either case, the necessary data are readily available.

The method that we have selected answers our problem. Its low cost, simplicity, and the time element involved commend it in this particular case. Directors of small botanical gardens have, at times, found it convenient to prepare diagrammatic sketches of plant groups as to the location of individual plants in a loose-leaf book. The method is excellent where large maps are not needed, but is inadequate in an area as large as the Arnold Arboretum.

These maps of the Arboretum will become a most important part of its records. They will be very useful to the visitor and to the student who wishes to consult either a few or many plants in any particular group. They will be able to locate what they are looking for with a minimum amount of walking. They will be of even greater use and value to the staff members concerned with the care, study, and amplification of the very extensive living collections. Comprising as they will the exact location of every planted tree and most of the individual shrubs within an area of 265 acres, representing somewhat in excess of 7000 named species and varieties, they will help make the Arboretum collections more and more a source of inspiration to the lovers of fine plants.

LEON CROIZAT