

Cartographic Records of the Living Collections

Ethan W. Johnson

The Arboretum's new maps will ultimately interface with the computer database, allowing extremely accurate tracking of accessions on the grounds

The first map documenting the placement of trees planted in the permanent systematic arrangement was made by Henry Sargent Codman in 1887. Only two years before, Charles Sprague Sargent and Frederick Law Olmsted had decided upon the final planting plan and landscape design, and implementation had begun in the spring of 1885. Codman, a cousin of Sargent, prepared a series of genus or group maps on a scale of 20 feet to the inch, showing the actual position of each tree with the number that appeared on its label. The question of preserving the identification of every tree in the collection in a more secure manner than that afforded by the labels used in the living collections was therefore resolved at an early stage of the Arboretum's development.

The Second Wave of Survey

León Croizat, using a 150-foot tape and a plane table equipped with an alidade, resurveyed the entire grounds between October 1, 1937, and October 5, 1938. He established a grid system that was aligned to conform with the boundaries of the Arboretum instead of being set on the usual north-south axis. The standard maps were again made at a scale of 20 feet to the inch, each representing an area 400 by 600 feet, but there were still some that did not conform to the grid. These maps, done to show a specific genus or other group of plants, were made at a scale of ten feet to the inch (or sometimes five or even two feet to the inch) when the areas were densely planted. From 1938 to 1970, the living collections were

field-checked and the maps traced and revised by Heman Howard. Howard field-checked the entire collection on a two-year cycle and revised the maps on a six-year cycle; his efforts produced results that were unparalleled by his contemporaries. From 1970 to 1979, the mapping duties fell in turn to three separate individuals. Following the departure of Donald Wyman, horticulturist, in 1970, the maintenance of the card-file plant-records system and the responsibility of providing records information to the Plant Sciences Data Center (see article by Quigley) became part of the duties of the individual performing the mapping function. Field-check rates decreased, and the cycle of map revision was set at ten years. Since 1979, the Arnold Arboretum has actively sought an alternative to its antiquated system of maintaining cartographic records.

A New Age

In 1987 the Arnold Arboretum was granted \$25,000 by the Institute of Museum Services for the development of a model computerized mapping system. The goal of the project is to remap accurately the 14,500 plants in the Arboretum on a system that will interact with its plant-records database (*BG-BASE*) to produce continuously up-to-date, computer-generated maps that reflect the topography of the Arboretum's diverse landscape.

With the help of Bradford Washburn, then the director of Boston's Museum of Science, the Arboretum contracted a photogrammetric survey of the grounds by Swissair Photo + Sur-

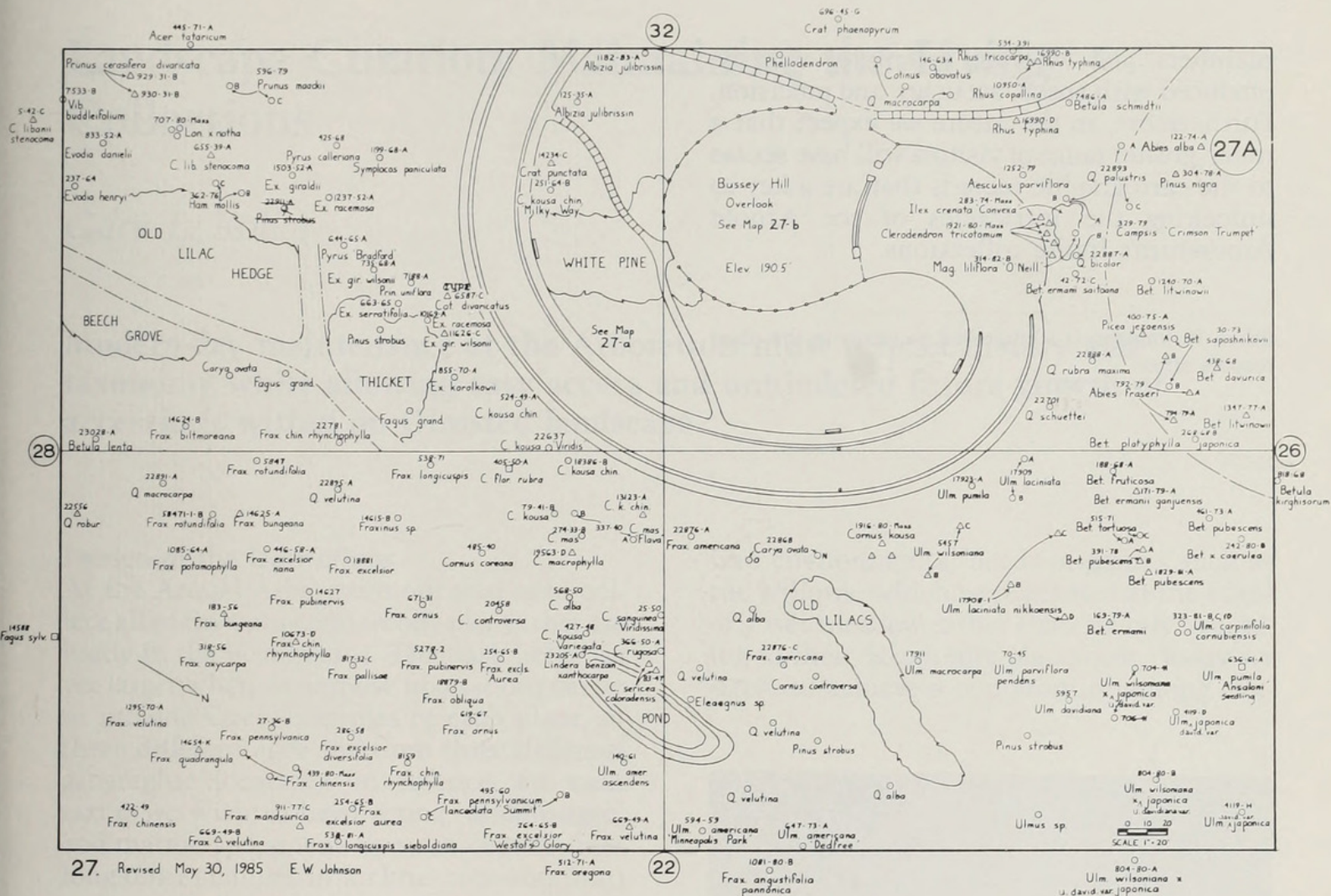


Our detailed inventory maps show every accession. Here, on the summit of Bussey Hill, the base map (right) shows the major plantings and specifies which inset maps cover thickly planted areas. The aerial photograph (above) is used in conjunction with the current maps and a computer-linked digitizing tablet to find the true coordinates of every accession distinguishable on the photograph. The photographs will help remove distortions caused by the irregular topography. Storing all the information on a database will allow us to update and print standard and specialized maps as needed. Photograph by Swissair Photo + Surveys, Ltd.

veys, Ltd. (Zurich). On a cloudless day in April, 1979, the survey crew took a series of aerial photographs, which were then transformed into orthographically corrected images displaying an exceptionally accurate picture of the Arnold Arboretum at a scale of 100 feet to the inch. A ground-survey team was hired to complete the contours in certain areas of the Arboretum that are covered by an evergreen canopy. Swissair provided the Arboretum with a base map of the grounds that illustrates true north, contour lines at intervals of ten feet, physical features (roads, paths, walls, and buildings), and reference points. This information was also provided in electronic form on floppy disk requiring a format

conversion of the data from *Intergraph* to *AutoCAD*, the computer-aided design software obtained by the Arboretum for the mapping project. Hardware purchased for the project includes a Compaq Deskpro 286 computer equipped with a monochrome monitor, Nth Engine Graphics, an Intel 80287 math coprocessor, a 24-by-36-inch Calcomp 9100 digitizing tablet, and an NEC Multisync II monitor for color graphics display. A Safe Standby Power System was obtained as insurance against computer crashes due to power failures.

An interface between *AutoCAD* and the plant-records database software (*Revelation*) is being written by Jung/Brannen Research and



Development Corporation of Boston. The Arnold Arboretum will construct a mapping system that is interactive with BG-BASE, wherein attributes and changes in the plant-records database will instantly be reflected in the mapping component (AutoCAD). Location data for specimens in the aerial photographs is entered into the graphics database by taping a photograph onto the digitizing tablet, calibrating the reference points, and digitizing the center of each plant visible on the photograph. The accession number for each specimen is entered at this point by comparing the photographs to the existing hand-drawn maps, thereby linking the graphics database with the plant-records database. This linkage will open the door to the production of specialized maps based on any number of fields of data stored in BG-BASE, including

plant family, genus, species, age, origin, and collector.

Great Expectations

We look forward to taking advantage of the computerized mapping system, the benefits of which will begin to be realized when the project reaches completion. Before we can generate maps, though, we must finish entering the data for all accessioned plants on the grounds—a task scheduled for completion by August 31, 1989. Acquiring our own plotter will greatly facilitate map production and will eliminate the need for costly out-of-house services. Considerably less labor should be necessary to keep the computerized cartographic records current, since we will no longer have to draft the maps by hand. Specialized maps tailored to needs of individual staff

members and visiting scientists will be produced with speed, accuracy, and precision. Furthermore, in the future we expect that a much greater range of visitors will have access to the cartographic records that are a key to unlocking the intricacies of the Arnold Arboretum's living collections.

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