Our desire to fly must have been driven, in part, by wanting to have a bird’s-eye view of the land. Today, we can launch ourselves skyward simply by clicking on Google Earth, where a virtual world created by combining aerial photography, satellite imagery, and GIS (geographic information systems) unfolds on our computer screen.

Attainment of that instant bird’s-eye view was many years in the making, though. The first aerial photographs were taken from a hot air balloon in 1858 by the French portraitist “Nadar” (Gaspard-Félix Tournachon), who did so while tethered 240 feet (73 meters) above the village of Petit-Bicêtre near Paris. Two years later—also in a tethered hot air balloon—James Wallace Black ascended 1,200 feet (366 meters) over the densely developed port city of Boston, Massachusetts. His image, “Boston, as the eagle and wild goose see it,” is the earliest known aerial photograph still in existence. Kites, rockets, and carrier pigeons (outfitted with tiny breast-mounted cameras) were the next airborne means used.

Just a few years after the Wright brothers famous first flight, images were shot from an airplane piloted by Wilbur Wright, the first taken from an airplane. The military, both here and abroad, quickly grasped the value of these unexpectedly revealing views and established aerial reconnaissance units. Following World War I, newly created commercial companies expanded upon the progress made in aerial techniques.

New Equipment, New Techniques
Sherman Mills Fairchild started several of these new peacetime ventures. Fairchild had originally secured a contract with the army to develop a camera for aerial photography. With the shutter placed inside the lens, his high-speed camera was capable of producing images with little or no distortion, which made accurate mapping possible. Although the army did not take delivery of his cameras until after the war, Fairchild continued to improve upon his design and, in 1920, started the Fairchild Aerial Camera Corporation.

He also began designing aircraft to suit his photographic needs and founded his second company, Fairchild Aerial Surveys, Inc. The company is well known for the remarkable aerials it produced of every major city in the United States between 1920 and 1960, and the Arboretum was one of its earliest clients. Using one of the company’s specially designed cameras, a pilot flew over the Arboretum in 1927 in a Fairchild FC-1 and took “the first airplane view to show all of America’s greatest hardy garden,” as reported in the Boston Herald newspaper. This “bird’s-eye view” was
This 1927 Fairchild aerial photograph of the Arboretum, looking toward Boston, shows Peters Hill in the foreground and the familiar curlcue of roadway atop Bussey Hill.

This 2005 image was made with the same perspective as the 1927 photo. Peters Hill is in the foreground, but mature trees now obscure the top of Bussey Hill. Downtown Boston is seen in the distance.
reproduced in the newspaper's autogravure section on November 20, 1927.

Since that initial flight, photographers have used planes, helicopters, a dirigible, and, most recently, a drone as means to attain views of the Arboretum. The resulting collection of negatives, microfiche, prints (both black and white and color), and digital images provides a unique perspective and an amazing record of how change occurs in the Arboretum’s seemingly permanent landscape. Entire plant collections disappear only to reappear years later completely redesigned and reconfigured. Others simply disappear. A few migrate, acquire a new name, then eventually vanish. Roads appear, are paved, then unpaved, and fade away. Sidewalks and paths (whether planned or established by desire) do the same, and while our aerial archaeology has not revealed any crop circles, one can easily see the remains of the characteristic circles that signify abandoned planting holes, sites where specimens once grew.

Making Maps
The first vertically shot aerial survey of the living collections took place in 1936. (In vertical aerial photography the camera is in a level position and pointing directly downward, the best format for precise mapping.) This survey consisted of a series of four images taken by Bradford Washburn, then a 26-year-old instructor at Harvard’s Institute for Geographical Exploration. His long

A large paved circle for bus turnarounds is seen atop Peters Hill in this 1967 photograph. Prior to 1964 there was no paved roadway to the top of the hill. In the late 1990s the paving was removed as part of a landscape restoration project that returned the hilltop to a design consistent with Frederick Law Olmsted’s naturalistic style.

Additional unplanned footpaths created over the years are visible in this 2007 image of Peters Hill. In place of the pavement at the summit there are now a scattering of granite blocks used for informal seating. The granite blocks, recycled from a demolished Olmsted-era bridge that once stood near the Forest Hills Station, were originally placed in a circle on Peters Hill in the 1980s to deter a then popular youth activity—setting stolen cars on fire and pushing them down the hill.
When seen from above in this 1955 Bradford Washburn aerial (top), the broad, grassy plain just below the summit of Bussey Hill sports shadows of planting holes from the *Prunus* collection that once occupied the site, seen in the May 1929 photo (bottom) taken by the renowned New England landscape photographer Herbert Wendell Gleason.

affiliation with the Arboretum, coupled with his expertise in aerial photography and cartography, greatly influenced the number of aerial photographs taken of our landscape.

Mr. Washburn often acted as a project manager, directing and organizing both vertical and oblique (camera is angled) shots made of the arboretum. Under his direction an image of the
One of Washburn’s 1936 vertically shot aerals of the Arboretum. Marked on the map are:

1. Present site of the Dana Greenhouse, constructed in 1962, and the Leventritt Pavilion and Shrub and Vine Garden (an aerial view of this garden is on the front cover).

2. The site of the original Shrub and Vine Collection, now occupied by the Bradley Rosaceous Collection.

3. Site of the Bussey Institution, the location of the Arboretum’s greenhouses prior to 1962, and now the site of the Massachusetts State Laboratory.

4. Bussey Brook Meadow, also known as the South Street Tract and Stony Brook Marsh, prior to the pond being filled in and the creation of the Blackwell Footpath

5. Peters Hill had only the outer ring road at the time.

6. Weld Hill, once known as the Weld Walter Street Tract, prior to the construction of the Hebrew SeniorLife Center on the site of the former Joyce Kilmer Park

7. Highly visible remnant of Centre Street left from the Centre Street realignment and widening in 1931. Today, a grassy swath still indicates the route of the old roadbed.
entire Arboretum was taken in 1952. Then in 1955, his first year as chairman of the Arboretum’s Visiting Committee, he raised the sum of $310.00 from the committee for a flyover by Eastern Aerial Surveys, Inc., with the recommendation that a second survey take place the following spring. Twelve images resulted from the October 6 survey. Unfortunately there is no record of a spring session. Northeast Aerial Photos produced the first series of color images of the Arboretum in 1967. A year later, color images of the Hunnewell Building and the newly built garage facility were taken, and in 1974 a survey of the entire Arboretum produced a suite of seventeen images.

Bradford Washburn’s long-held goal of creating a mapping system of the Arboretum’s living collection based on aerial photography finally came to fruition when Dr. Peter Shaw Ashton, then director of the Arboretum, approached him in 1978 to orchestrate the coordination of a photogrammetric survey of the Arboretum by Swissair Photos + Surveys, Ltd. (now named Swissphoto AG).

“The 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.”

BRADFORD WASHBURN was an extraordinary man. Born in Boston in 1910, as a teenager he developed a love for mountain climbing, summiting peaks around the world in the days well before high tech climbing gear was available. As an undergraduate at Harvard he honed his passions—climbing, photography, and scientific exploration—and in 1934 pursued graduate studies in cartography, surveying, and aerial photography at Harvard’s Institute for Geographical Exploration. At 29 he became the director of the New England Museum of Natural History, now the Boston Museum of Science, a position he held for 40 years. As a pioneer in aerial photography, Washburn’s stunning mountain images made him one of the most important landscape photographers of the twentieth century. Recently, one of Washburn’s cameras (a 1929 Zeiss 4 x 5) was taken on the space shuttle’s Hubble telescope repair mission by astronaut and mountain climber John Grunsfeld. It seems fitting that Washburn’s camera was used to make the ultimate in aerial photos—images from space.
Susan Kelley, then curatorial associate in mapping, and I met with Mr. Washburn in 2000 to learn more about his early Arboretum work. He believed that his photographs of the collections would eventually provide a valuable record. Upon seeing our current maps of the living collections, which were based on the 1979 photogrammetric survey and formatted in AutoCAD, which interacts with the computerized plant records database, BG-Base, Mr. Washburn pronounced them “gorgeous!”

More Bird’s-eye Views

Sasaki Associates Ltd. produced aerials in 1990 and 1991 as part of the Arboretum’s Master Plan process, and in 2002 the Arboretum participated for the first time in a survey of the Harvard campus, which was coordinated by Harvard’s Planning and Real Estate Department. The living collections were again included in the Harvard survey in 2006. Recently, when aerial imagery has been needed, photographs have also been acquired from surveys done by the United States Geological Surveys (USGS). Our most recent full scale vertical aerial view of the entire Arboretum was taken in spring 2008, as part of the USGS Boston 133 Cities Urban Area mapping program.

Interspersed between these major surveys were other more site specific or overview flights. In 1950, Arboretum horticulturist Donald Wyman took a series of photographs at a
height of 3,000 feet from a plane flown by his 17-year-old son. Wyman’s photographs were taken from a vantage point reminiscent of the 1927 Fairchild survey images. Eight years later, Heman Howard, in charge of the mapping and labeling department, also duplicated this view with a series of oblique shots from both 1,400 and 2,300 feet. The Massachusetts Department of Public Works photographed the lilac collection and replicated the bird’s-eye view in 1969 and, in 1995, Sergio Marino of GPI Models took a series of images from a helicopter to facilitate his construction of an 8 feet by 16 feet scale model of the Arboretum. The model became
the centerpiece for the exhibit *Science in the Pleasure Ground* in the Arboretum’s Hunnewell Visitor Center, where it continues to be a popular feature. My brother, Jay Connor, has taken almost 200 oblique images of the collections. He began photographing the Arboretum in 2004, usually from a helicopter, but once from the iconic Hood Blimp, officially an American A-60+ Lightship. This familiar cigar-shaped balloon is capable of hovering motionless for hours at a time. As Boston Red Sox fans can attest, it is truly an airship designed for aerial observations.

The Arboretum’s most recent aerial photography project involves the new research facility on Weld Hill. Over the past two years, Dave Fuller of Fullerview Photography has sent up a drone to capture images of the construction of the building. Over the coming months, arboretum staff will be adding aerial imagery to our GIS (geographic information system) using ESRI software. This will provide a new generation of bird’s-eye views of the arboretum’s landscape and its change over time. Incorporating these images into our GIS system will assist in reconciling diverse georeferenced features and provide unprecedented detail about our living collections for researchers and visitors.

Sheila Connor is the Horticultural Research Archivist at the Arnold Arboretum.