Report on Hurricane Gloria

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A timely shift in course spared the Arboretum’s Living Collections the brunt of a potentially destructive storm

In the course of our work, we are continually reminded of the Arnold Arboretum’s losses in hurricanes and other storms. Thus, the staff of the Arboretum faced Friday, September 27, 1985, with mounting anxiety: Hurricane Gloria was headed our way. The plant records abound with notations of damage and losses, and the photographic archives document trees felled by the hundred, massive limbs torn from more-firmly anchored trees, and plantings flooded by the heavy rains generally associated with hurricanes. The Living Collections themselves carry the mark of every major storm of the Twentieth Century: groves of native species planted by Charles Sprague Sargent as a framework for the collection have been thinned to scattered specimens, and few mature trees do not bear the scars of storm damage.

By far the worst damage was caused by the “Great Hurricane” of September 1938, which destroyed nearly 1,500 trees in the Arboretum. As Gloria approached, the weather reports invited comparisons between the two. Both were spawned off Africa’s west coast, and Gloria followed a route across the Atlantic almost identical to that of its predecessor. With wind velocities of 130 miles per hour off the Carolinas, Gloria threatened to be as destructive as the “Great Hurricane” had been. The grounds staff were mobilized to secure the buildings against the coming storm. Four men labored for over an hour to move the Lars Anderson Bonsai Collection to safety. An irreplaceable collection of 31 specimens with documented ages of up to 250 years and weights of up to 250 pounds, these were the only plants for which any precautions could be taken.

Pin oaks (Quercus palustris) blown over by the 1938 and 1985 hurricanes, left and right photographs, respectively. Photographs of damage that occurred in 1938 were taken by Donald Wyman and are in the Archives of the Arnold Arboretum, those of damage caused by Gloria were taken by Peter Del Tredici.
Tulip trees (Liriodendron tulipifera) blown down in 1938 (top) and 1985. Both victims grew in the same grove, behind the Hunnewell Visitor Center.
A Shift in Course

As Gloria continued up the coast, however, it took a more northwesterly course than the 1938 hurricane had done and, travelling along the coastline rather than over open water, steadily diminished. It travelled up the Connecticut River valley some 50 miles to the west of the course that would have brought the brunt of the storm through eastern Massachusetts, thus sparing the Boston area its full force.

In the Boston area, Gloria's wind speed hardly reached hurricane force (74–75 m.p.h.). Sustained winds of between 50 and 60 m.p.h. were felt for about two hours, with a maximum speed of 76 m.p.h. recorded at 4:08 PM by the U.S. Weather Bureau. The Blue Hill Observatory recorded gusts of 103 m.p.h. By contrast, sustained winds of over 60 m.p.h. were recorded for nearly four hours in 1938; the U.S. Weather Bureau recorded a maximum speed of 87 m.p.h., and the Blue Hill Observatory reported gusts in excess of 150 m.p.h.

Another contrast between the two storms was in the amount of rainfall associated with them. In 1938, the hurricane was preceded by four days of soaking rain, and the sodden ground provided no anchor against the wind. Gloria brought an official 0.28 inch at Boston's Logan Airport, although the weather station at the Arboretum's Dana Greenhouses recorded 0.47 inch.

Despite its shortcomings in the eyes of Boston's stormlovers, some 25 of whom gathered atop Peter's Hill during the peak of the storm, Gloria left its mark on the Arboretum. The staff who follow us will find record notations, archive photographs, and scarred trees to document the immediate loss of 45 trees and major damage to another 100 in the collection, and the loss of approximately 30 native trees from the Arboretum's natural areas and 20 from the Case Estates woods.

Gloria struck on a Friday afternoon, and although several staff members surveyed the grounds for damage after the storm had passed, it was not until Monday morning that a full evaluation could be made and the task of cleaning up could begin. As curatorial staff charted damage, the grounds staff were already at work clearing the road and path system. The entire grounds staff of nine was assigned to clean-up for a week, at the end of which time the roads and paths were clear and dangerous hanging limbs had been removed. The task will continue for some time, however. Fall planting had just begun when the hurricane struck, and although almost a third of the plants scheduled for addition to the Collections this fall could be set aside for spring planting, there were a thousand plants still to be added before the planting season drew to a close. Renovation work in the Bradley Rose Garden could not be delayed until spring. The two-man pruning crew, with additional help as available, will continue storm clean-up through the winter. Gary L. Koller, the Arboretum's Managing Horticulturist, estimates that the total cost of removal will be $40,000 or more, and that the value of plants lost is in excess of $100,000.

Damage to the Collections

As damage reports were drawn up, the propagation staff were advised of those plants for which immediate action was necessary. Scion material was collected from fallen trees before desiccation could render the material unusable, and put in cold storage to await the proper time for grafting onto suitable understock. Roots were dug from beneath a severed Euptelea, in hopes that suckers will continue the lineage through another generation. When possible, damaged trees will be allowed to
stand until the proper time for scions or cuttings to be taken, as this will increase the chances of success. Fortunately, few of the casualties were not represented by specimens elsewhere in the Collections; the aesthetic damage to the Arboretum is significant, however. Major damage was done to the hickories (Carya spp.), oaks (Quercus spp.), maples (Acer spp.), ashes (Fraxinus spp.) and poplars (Populus spp.), and significant damage to the magnolias (Magnolia spp.), willows (Salix spp.), and lindens (Tilia spp.).

Among the most distressing individual losses are:

- Two tulip trees (Liriodendron tulipifera), aged 79 and 91 years, one reaching 85 feet in height, torn from the hillside behind the Hunnewell Visitor Center;
- A silver maple (Acer saccharinum), aged 104 years, which was so badly damaged that it will be removed from its prominent location along Meadow Road, while another of the same accession lot, taller but with a narrower crown, standing nearby, was relatively

A beautiful specimen of white pine (Pinus strobus), near the top of Bussey Hill, damaged (photograph at right) by Gloria. Many people considered it the most picturesque tree in the entire Arboretum. Already well established when the Arboretum was founded in 1872, the tree had survived many natural disasters, including a strike by lightning, before Gloria broke its beautiful overhanging limb, shown intact in the left-hand photograph. Because the limb grew at a right angle to the trunk, extensive amounts of reaction wood had been deposited along its lower surface in response to the tremendous load it therefore had to carry. Both photographs were taken by Peter Del Tredici.
untouched;
- A European larch (*Larix decidua*), aged 99 years, uprooted near the Walter Street Gate;
- Three Japanese larches (*Larix leptolepis*), aged 65 years, two uprooted and one broken at 12 feet, on Peter's Hill;
- *Euptelea polyandra*, aged 93 years, and the only remaining representative of seeds collected by C. S. Sargent in Japan, severed at its base;
- The Arboretum's only plant of *× Crataegosorbus miczurini*, an intergeneric hybrid of hawthorn and mountain ash, also severed at the base;
- A Carolina hemlock (*Tsuga caroliniana*), aged 99 years, snapped off at 12 feet, on Peter's Hill;
- A particularly handsome pin oak (*Quercus palustris*), aged 46 years, uprooted from its prominent location at the intersection of Valley Road and Conifer Path; and
- A magnificent purple beech (*Fagus sylvatica forma atropunicea*), one of the trees which remain from the original plantings at the Bussey Estate, badly broken but still standing; although only about half of the crown remains, it is expected that the tree will not have to be removed.

**Earlier Hurricanes**

With the exception of Hurricane Diane in 1955, whose major damage appears to have been flooding, every hurricane that has hit the Arnold Arboretum has been recorded in the *Bulletin of Popular Information*, or in *Arnoldia*, as follows:

*Bulletin of Popular Information*, Series 4, Volume 6, Number 12, October 7, 1938 (the "Great Hurricane" of 1938);
*Arnoldia*, Volume 14, Number 8, September 24, 1954 (Hurricanes Carol and Edna); and
*Arnoldia*, Volume 20, Number 7, September 23, 1960 (Hurricane Donna).

In addition, Donald Wyman's article on the selection of trees based on their performance in the hurricane of 1938, and the rehabilitation of trees injured by hurricanes, which was published in *Arnoldia*, Volume 14, Numbers 9–10, October 15, 1954, is still in print. Copies are available for $2.50. Address orders to: "Hurricane," Publications, The Arnold Arboretum, The Arborway, Jamaica Plain, MA 02130. Prepayment is required.

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