The Flying Dogwood Shuttle

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Right up to the end of World War II the production of wooden goods played a major role in the New England economy. While fuel wood, pulpwood, and lumber for ties, poles, and beams left the forest or sawmill in rough form, a thriving concentration of regional industries converted forest resources into more finished "secondary" products. The shuttles, spools, and bobbins manufactured for the textile mills as well as the lasts and fillers destined for shoe factories were not only made and used in New England but were also exported worldwide. And all of New England's products—wooden or not—were packed and shipped in pine crates and excelsior out of mills from Maine to Connecticut.

By the 1960s, textile and shoe manufacturers had all but forsaken New England. Like their predecessors the tanning, naval stores, and shipbuilding industries as well as the arms and charcoal makers, they had ceased to be great consumers of wood. New technologies evolved, and just as large-scale manufacturing dwindled in New England, so too has the role of wood. The age of the plastic "peanut" has no need for paper packing or its nearly forgotten precursor, the wonderfully fragrant excelsior. Pocket calculators have completely replaced rock-maple and even plastic slide rules. Cedar and spruce canoes are made of Kevlar and fiberglass; and baseball bats, formerly made of ash, are now fabricated in aluminum.

Working with wood once meant dealing with either the whole tree or with products made from portions of its trunk, and the qualities specific to each species—its capacity to bend, its moisture content, hardness, strength, or brittleness as well as its ability to hold nails, take paint, and saw easily—determined which trees were used. One such tree, the native flowering dogwood, *Cornus florida*, is now best known for its beautiful spring blossoms. But in earlier times it was the strength and durability of its wood, not its beauty, that attracted attention.

The Demand for the Dogwood Shuttle

For over a century, the dogwood's usefulness to the nation's textile industry would compete with its value as an ornamental tree. From the American Industrial Revolution's northern beginnings until long after most textile manufacturers moved their operations south and left New England's mills standing silent, the wood of the flowering dogwood was an intrinsic part of the weaving process. In the complex process of weaving cloth, one simple device remained unchanged: the fast-flying, bullet-shaped shuttle made of dogwood.

The first shipment of dogwood logs bound for England left America in 1865. After their arrival, it is presumed that these logs were cut, seasoned, and turned into shuttles for England's textile mills. Up until midcentury, boxwood (*Buxus sempervirens*) shuttles had
Dogwood
been the mainstay of the industry, but as the lumber needed for shuttles rose proportionally to the number of looms in operation in the Northeast and in England, the American tree became a popular substitute. By the third quarter of the nineteenth century, the use of dogwood had increased markedly.

The wood of flowering dogwood is hard, heavy, tough, close-grained, and abrasion-resistant. When textile manufacturers realized that the longer a dogwood shuttle was in use the smoother its satiny wood became, dogwood became the wood of choice. Smoothness rose to top priority soon after John Kay, an English carpet weaver, invented a mechanized shuttle in 1733. Prior to Kay’s invention, almost any hardwood made a satisfactory shuttle; hand weavers simply passed the small, oblong piece of wood that held the bobbin from one hand to the other. As a weaver of carpets, Kay had to deploy two workers, one on either side of his large, oversized looms, to toss the shuttle back and forth. Besides requiring two people for the work of one, the shuttle often dropped uncaught onto the warp threads, damaging the fabric and stopping the loom. Inspired, no doubt, by clumsy workers, Kay devised a driver attachment controlled by a cord that propelled the shuttle from one side to the other. But because the shuttle now remained in contact with the warp threads as it shot back and forth, a wooden shuttle that checked, split, or had rough edges was worse than useless. Kay’s invention, aptly called the flying shuttle, was the first step in the automation of weaving.

The Lowell Mills
The first American mill to produce shuttles began operating in Lowell, Massachusetts, in about 1875. Like its English counterparts, the Lowell mill acquired dogwood logs from the forests of Virginia. Flowering dogwood grows in the wild from extreme southwest-Maine southward into northern Florida. Even in the center of its commercial range, which is in the southern Mississippi Valley and the southern Appalachian Mountain region, this tree is seldom found growing in pure stands. In the years of its commercial use, woodcutters had to scour between ten and fifteen acres of forest before finding enough flowering dogwoods to harvest a cord of wood. While it is not rare in eastern Massachusetts, this small understory tree appears with greater frequency in the Connecticut River Valley and in Rhode Island and Connecticut.

The fruits and flower buds of Cornus florida.
Although boxwood was used in the original Plympton Skate, as shown here in an 1884 advertisement in Spalding's Manual of Roller Skating, it was soon replaced by the stronger, more durable dogwood. The roller skate was invented by furniture manufacturer James Leonard Plimpton. Having enjoyed a winter of ice skating in Central Park, he was determined to continue skating year-round. Within one year he had invented and patented his roller skate, organized the New York Roller Skating Association, and undertaken a promotion campaign directed at the “educated and refined class.”

By 1926, ninety percent of the flowering dogwood harvest went into shuttles. Most were manufactured in Massachusetts and Rhode Island, and over half were exported to Germany, France, and Great Britain. In 1942, demand for military cloth and warfare textiles heightened the need for shuttles to the point that the country ran out of reserve supplies. The U.S. Department of Agriculture issued a plea for harvested dogwood, noting that although many substitutes had been tried, no wood with similar qualities had been found. Farmers and woodlot owners were urged to contact block mills or buyers to arrange for the sale of marketable trees.

As late as 1945 a U.S. Department of Agriculture publication commented, “Shuttles are indispensable to the cotton, woolen, and silk mills of the country.” Plastic shuttles replaced wooden ones shortly thereafter, but they didn’t last long. New shuttleless looms were designed, and within a generation New England mills still using the old machines were antiquated, surpassed by their southern competitors. Except for artisans who use hand looms and a few specialty weavers who create one-of-a-kind fabrics on older wooden power looms, fabric is now woven entirely by shuttleless looms. Flying shuttles made of satin-smooth dogwood have become a thing of the past.

The Future for New England Forest Products

Today new methods for processing wood and tree products determine how many New England species are used. In some cases, these advances have permitted the substitution of one wood (or a combination of woods) for another. The development of durable synthetic resin adhesives during World War II expanded and redefined an entire range of wood-based products. Glue-laminated timbers, exterior plywood, and sandwich panels (two thin facings of wood bonded to a thick core of weak and low-density material such as rubber foam, foamed glass, cloth, metal, or even paper) increased the capacity of wood to bend, weather, and provide thermal insulation. It even makes the wood more fire resistant.

Raw materials need not come from the forest in log form: particleboard, flakeboard, waferboard, and oriented strand board all use wood that is first reduced to small fragments and then bonded. Sawmills no longer create waste; every part of a log is usable, whether as bark, chips, or sawdust. And coarser
The Dogwood Through the Seasons

When the dogwoods flower the Arnold Arboretum seems to sparkle. Although most of the Arboretum's major groups of trees are arranged taxonomically, when it came to siting the dogwoods Charles Sprague Sargent, the Arboretum's first director, wisely chose to ignore scientific dictates and instead followed the advice of Frederick Law Olmsted. Rather than restricting them to their place in botanical sequence, Sargent interwove them throughout the grounds just as they grow in natural forests.

Flowering dogwoods can reach forty feet in height, but in New England they usually grow to only fifteen to twenty-five feet. *Cornus florida* flowers well in shade or sun but forms a more compact shape with a flat-topped crown when growing in the open. With wide-spreading horizontal limbs that are delicately aligned tier upon tier, a mature dogwood tree can often become as wide as it is high.

In spring these small understory trees are covered with large, handsome, bright-white bracts that surround the small clusters of the true, minute yellowish-green flowers. The flowers begin to form during the previous summer. Throughout fall and winter they remain enclosed and protected by four light-brown to grayish involucral scales. In winter the flower buds are conspicuous. Looking like little Turkish caps or turbans the size of a large pea, they are held up from the ends of the branchlets by stout, reddish, quarter-inch peduncles, or stalks. In spring the peduncle lengthens to become an inch to an inch-and-a-half long. The bud's protective scales, the bracts, begin to unfold, enlarge, and turn white. Some trees have pinkish-white bracts, and occasionally a tree will sport bracts of a deeper pink.

By midsummer, two to five berrylike drupes, each containing two very hard, notched stones that enclose the seeds, have developed. By fall, these oval-shaped drupes are a brilliant red and become a source of food for migrating flocks of birds.

Dogwood leaves are from two to five inches long, have wavy margins, and grow opposite one another. The fall color of this small tree's leaves and berries make the dogwood as handsome a tree during that season as it is in spring. By October the upper surfaces of the leaves have turned from a dark green to a shiny rose, scarlet, or violet color. Providing an ideal foil for these deeper hues, the underside of the leaves remain as pale and whitish as they have been throughout their growing season.
residues from secondary forest products, such as planer shavings, plywood mill waste, round wood waste, and wood chips, have become an important source of raw material for fiber-based reconstituted woods. Insulation board, fiberboard, and laminated paperboard are just a few of the products composed of wood that is first reduced to fibers (or fiber bundles) before being reconstituted by a manufacturing process that produces panels of relatively large size and thickness. Innovations such as these have impelled the industry to improve forest management practices.

The Regrowth of the Forest

Early New England colonists came to a land that they described variously as “a well-wooded earthly paradise” or “a hideous and desolate wilderness.” By the nineteenth century, fear that the nation’s forest resources could be depleted had taken hold. In 1880 Charles Sprague Sargent, then the young and ambitious director of a new Arnold Arboretum, undertook a study of the nation’s forests, “the much needed work [to show] the great wealth and value of our forests, and the dangers with which their destruction will threaten us.” He could not have foreseen our situation in 1992. At no time since the arrival of the first Europeans has so much of New England’s landscape been forested as today. It’s neither paradise nor wilderness, but a new Yankee forest aptly described as a patchwork of wildlands and woodlots. From the sandy promontories of Cape Cod, where the wind sculpts the waist-high scrub oaks and twisted pitch pines, westward to Connecticut’s stands of oaks and hemlocks, and northward into the “big woods” of Maine, the country of spruce and balsam spires, eighty-one percent of the region’s land surface is once again covered by forest.

Today over 108,000 New Englanders work either in the forest or with the forest’s products. Of these, over 61,000 people hold jobs associated with the paper industry. Lumber and wood products employ an additional 30,000 people, and close to 17,000 workers make furniture and other wooden fixtures. While synthetics are now often substituted for wood, wood remains the best material for much of what we use daily. Tradition and aesthetics influence our preference for wood, but in many instances its durability, coupled with its renewability as a resource, makes it a sound, economically and environmentally wise choice as well. Thus New England’s forests continue to support a multitude of specialized industries and countless small, family-owned businesses that transform trees into durable goods. New Englanders are makers of paper and boxes, wooden ware and picture frames, tennis rackets, tool handles, toys and snowshoes and musical instruments. Working with lathes, saws, and drills, skilled operators turn out cabinets, doors, windows, and millwork as well as sashes, trims, plywood, and pallets. And artisans make everything from furniture to boats with hand tools, occasionally in conjunction with ancient woodworking machines driven by waterpower. In so doing, they insure that many of our old ways with wood endure.

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