

Beech: A Tough Nut Worth Cracking

One of the most
unruly of woods is also
among the most useful

BY JON ARNO

The joy of working with beech lies in the game the wood presents—the tantalizing challenge of how to tap its enticing qualities while avoiding its devastating shortcomings.

Beech's assets are many. Close grained, it machines and turns well with minimal tearout, and it takes finish beautifully. Its hardness and ability to absorb shock make it the wood of choice for many workbenches, tool handles and mallets. Perhaps beech's greatest attribute is the ease with which it can be steam-bent. Beech has astonishing plasticity when exposed to heat and moisture. Once steamed, it will conform to jigs that demand surprisingly tight bends without failing, and once dry, it experiences relatively little rebound.

But then there is the evil side of beech: It is extremely unstable. An average plank of beech can shrink 17.2% on its way from green to oven dry, one of the highest rates of shrinkage among domestic hardwoods. Beech's tendency to swell and shrink with changes in humidity is nastily compounded by the enormous differential between the wood's radial and tangential shrinkage. This differential makes beech one of the most difficult woods to season without warping and to keep flat once it is dry. Most other woods with comparable shrinkage factors are rendered useless by their propensity to check and split. Fortunately, beech is spared this fate by its abundant medullary rays, which tend to hold it together. One final frailty of beech is its poor durability when exposed to the elements.

Best uses of beech

Beech is a high-contrast species—one with a great gulf between its outstanding virtues as one of our most workable woods and its horrendous shortcomings in terms of stability and durability.

Beech's deficiencies haven't kept it from attaining a place among the most useful of

Bark parchment. Because beech is tight grained and good for holding detail, slabs of it were once used as writing tablets; centuries later, the same virtues led early printers to use type cut from beech. But the most prevalent link between writing and the beech tree must be the one that occurs on the bark at the point of a penknife.



Grand foliage. Notable for its skin-smooth gray bark and powerful trunk, American beech, *Fagus grandifolia*, attains a magnificent shape when planted in the open. Its large, spreading branches carry acres of small, lance-shaped leaves.



Beech bends beautifully. A Thonet chair made in the 1860s illustrates the pliability and durability of steam-bent beech. By utilizing only small-diameter parts, the chair also minimizes the effects of beech's excessive seasonal movement.



For planes and benches, beech is best. Beech is long wearing, dense, shock resistant and abundant, qualities that have made it the enduring wood of choice for the majority of wooden planes and workbenches.

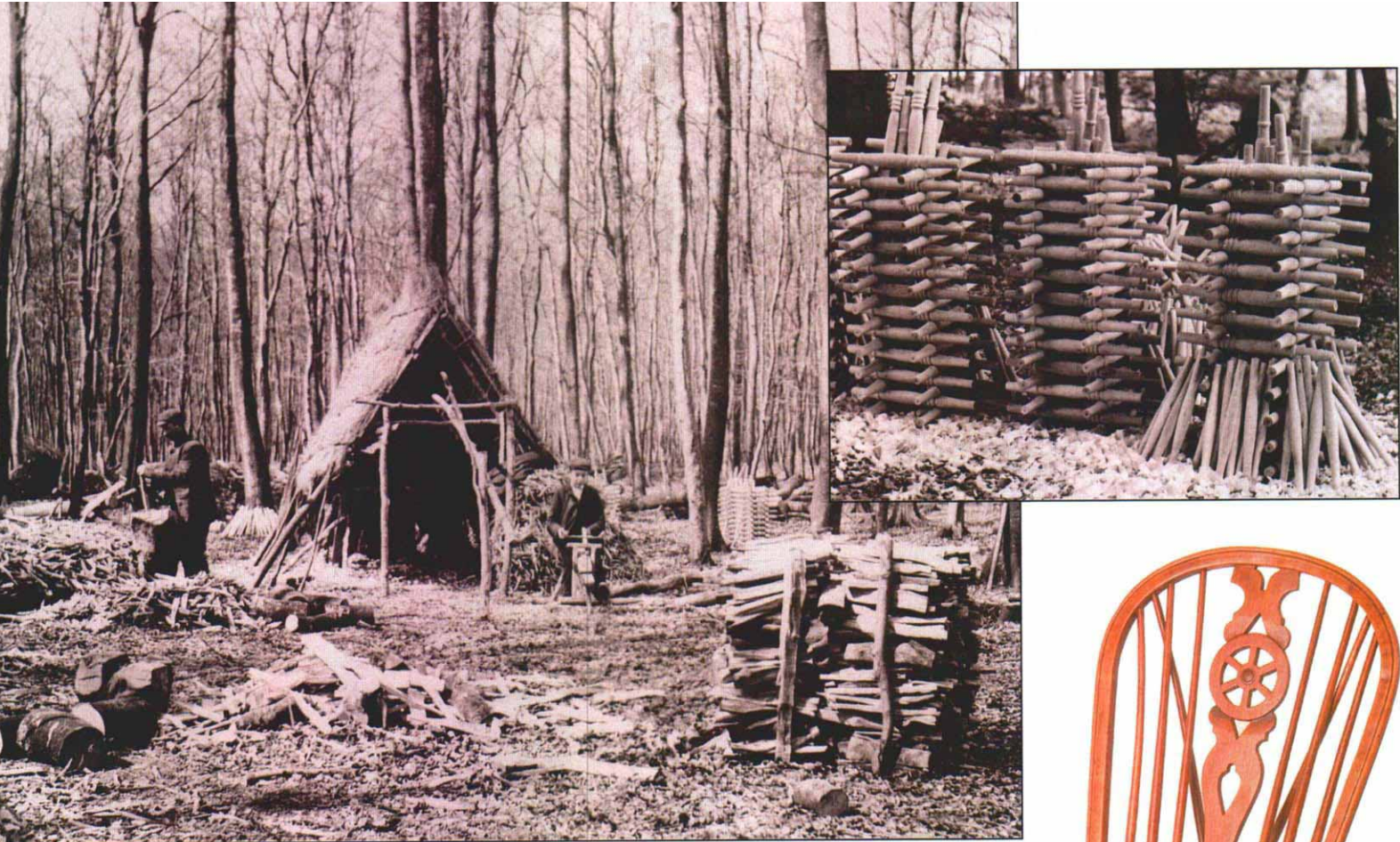
woods. And we can learn how best to employ beech by studying how it has been used by woodworkers of the past.

In period furniture, beech is seldom seen as the primary wood in tables or case goods, where its lack of stability would be devastating. And in exterior applications, either it was seldom used or has not survived. However, it is found in abundance as turning stock, as glue blocks in the framing of upholstered furniture and as bentwood parts in chairs, where it is excellent both for steam-bending and bent lamination. Thomas Chippendale, although addicted to mahogany in fashioning the rococo style of furniture for which we know him best, used beech in special applications, for fretwork panels in his Oriental styles and as core stock for primitive "plywood" slats, where resistance to splitting was a key feature.

Fortunes have been made on the bending capacity of beech. The Thonet chair company (see the photos at left) built its factories in the beech forests of Austria and Eastern Europe and then built an international bentwood chair-manufacturing empire on the strength and pliability of the wood the company harvested there.

Beech has been used extensively for turned or shaped objects, especially one-piece items—such as tool handles, wooden knobs and pulls—that are free to deform a bit without causing functional problems. Beech has also played a major role in the production of mundane yet essential things such as clothespins, kitchen utensils and scrub-brush backs. Its use in food containers and tight cooperage peaked in the late 19th century, but even today one major American brewery touts the contribution to flavor made by the beech-wood vats used to age its beer. Beech's low tannin content apparently puts a mellow finish on the brew. That low tannin content is also important to woodworkers: On the positive side, the low tannin content makes beech less likely to corrode iron fasteners and hardware; on the negative side, low tannin content contributes to beech's poor durability in the weather.

Perhaps the most ingenious exploitation of beech can be seen in early examples of Windsor chairs. Thousands of these chairs were



Wisdom of the Windsor makers. Windsor chair makers, savvy at selecting the most suitable wood for each part of a chair, chose beech for turned parts. At the height of the popularity of Windsors, pole-lathe turners in Buckinghamshire, England, bivouacked in the beech woods and turned stacks of legs, stretchers and spindles for the many chair makers in High Wycombe (inset). A wheel in the back splat and a fan tail supporting angled spindles at the back of the seat typify the High Wycombe Windsor style (right).

churned out in the 1800s by bodgers who worked literally out in the forests around High Wycombe, about 25 miles northwest of London, where beech was once plentiful. The fine texture and diffuse-porous anatomy of beech made it easy to turn into spindles on primitive lathes. In this role, even the wood's extreme tendency to shrink and swell proved to be an advantage, because the spindles could be thoroughly seasoned and then tapped into the more moist, steam-bent backs and armrests. The spindles swelled while the backs and armrests shrank, providing extremely tight joints without the need for adhesives. While many of these rugged and inexpensive chairs were sold unfinished and referred to as "white Wycombes," the wood's tight-grained, smooth surface made paint finishes easy to apply and equally popular.

One application that has me somewhat puzzled is the prevalent use of beech in making wooden plane bodies. Before the advent of the modern router, a set of molding planes was a necessity in cabinetmaking and finish carpentry. Possession of such a set was a source of pride to the accomplished 19th-century woodworker, and these pretty, little beech-bodied planes were often themselves works of art. Beech's workability and formidable resistance to wear make it a plausible candidate in this role, but one would think its notorious instability would pose a serious negative.

Using small parts is key to managing the movement in a wood like beech. A good example of this approach is seen in flooring.

The machinability and resistance to wear that make beech a superior wood for plane bodies also make it suitable for flooring. But when used as flooring, beech requires a design that minimizes the risks inherent in its high shrinkage and instability. The answer is parquet squares, small pieces where the joinery allows the wood to move in almost unnoticeable increments. To me, examples of ingenuity such as this showcase the essence of beech and its redeeming grace.

It is no coincidence that the words beech and book stem from the same Sanskrit origin. Not only does the utility of beech wind through history, but the wood is also an inseparable part of history's recording. Norse tribes used beech bark as crude writing pa-

per, and more indelible records called runes were sometimes carved in slabs of beech. And in the 15th century, Gutenberg's first bible was printed using type carved in beech blocks.

Beech is oak's mellow cousin

Although it boasts only 10 species worldwide, beech (genus *Fagus*) lends its name to the ancient and enormous Fagaceae family, which also includes the mighty oaks (genus *Quercus*), with their more than 450 species. Beech is comparable in density to northern red oak, *Q. rubra*, and, like red oak, beech has heartwood with a warm, pinkish tan color that is especially attractive and seems to darken noticeably when varnish or even crystal-clear lacquer is applied. Beech's close relationship to the oaks is also betrayed by its abundant and clearly visible rays. Although the rays in beech are much smaller than those in white oak and even diminutive in comparison to those in red oak, they are exceptionally plentiful, dark and distinct and provide a sure way to identify the wood. While most of our oaks possess an extremely loud, ring-porous figure, beech is diffuse-porous and so mellow that it would be downright bland in appearance were it not for the rays. (In ring-porous woods, the larger, sap-carrying vessel cells are concentrated in the earlywood; in diffuse-porous woods, vessel cells are evenly distributed throughout the wood.)

Being diffuse-porous conveys to beech a number of benefits in terms of workability. Beech tends to hold details when shaped, and it turns with far less tearout than do the oaks. Also, being substantially finer textured than the oaks, beech requires no fillers to achieve a smooth finish. Although it is certainly not in a class with extremely fine-textured woods such as maple or even cherry in terms of ease of finishing, several coats of a heavy-bodied varnish will inundate its relatively modest porosity and can then be rubbed out with fine-grit abrasives to achieve a glass-smooth surface.

Which way to the beech?

When the first Europeans arrived, America was rich with beech groves. Although there are still plenty of beech trees, most of the old, dark, gloomy groves are gone.

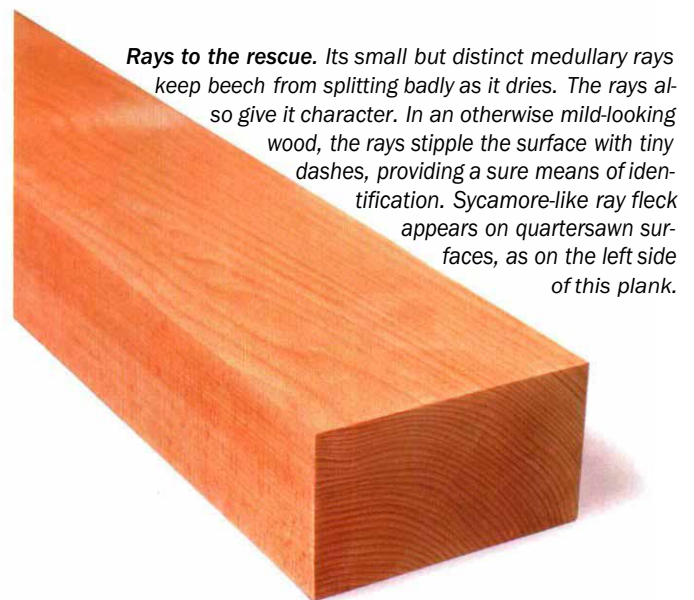
Only one species of beech, *F. grandifolia*, is native to North America, but it is divided into at least four relatively well-defined races—the gray beech that grows from Wisconsin to Nova Scotia; the red beech throughout most of Appalachia and the central Midwest; the white beech along the coastal plain from Louisiana to North Carolina; and the Mexican beech in the mountains northwest of Vera Cruz. Growing conditions have an impact on the working characteristics of these woods. The white beech of the

South grows faster and tends to be slightly softer and coarser textured than red or gray beech, while the latter two generally produce more attractive and darker rust-brown heartwood. All North American beech trees make slow progress in converting sapwood to heartwood, and even the best logs contain large quantities of rather drab creamy sapwood. The sapwood is often discolored by fun-

gus, giving it a dirty gray hue. For all of these reasons, the appearance qualities of beech are highly variable, and there is no substitute for firsthand examination of the stock in selecting choice material for special projects.

If you buy a Swedish workbench or an Austrian bentwood chair, it will most likely be made of European beech, *F. sylvatica*. The European tree is a different species from our native beech, but there is hardly a lick of difference between the two. European beech also varies based on climate, with wood from Central Europe tending to be softer than that from England and Scandinavia.

Although mature stands of our American beech were virtually wiped out, beech is certainly not scarce today. The current U.S. reserve of beech sawtimber exceeds 21 billion bd. ft., making it about twice as plentiful as cherry. The problem experienced by many woodworkers in sourcing beech is that only a trickle of the overall harvest makes its way to the retail market in the form of lumber. High-grade stock tends to be absorbed by flooring manufacturers and other industrial users while the low-grade material is



Rays to the rescue. Its small but distinct medullary rays keep beech from splitting badly as it dries. The rays also give it character. In an otherwise mild-looking wood, the rays stipple the surface with tiny dashes, providing a sure means of identification. Sycamore-like ray fleck appears on quartersawn surfaces, as on the left side of this plank.

sponged up by crate and pallet producers. When it is available, however, beech is relatively inexpensive when compared with similar grades of other, more popular cabinetwoods.

Don't dry this at home

Ordinarily, on other species with similar supply patterns, I'm a strong advocate of harvesting your own and air-drying it. Beech, however, is a noteworthy exception. The incredible drying stress this species experiences makes it one of the most difficult of our native woods to air-dry. If you can't find kiln-dried beech at a local hardwood retailer, perhaps the most sensible option is to visit the nearest sawmill with commercial kiln-drying capability and expertise. Although this sometimes means buying relatively large minimum quantities, it offers two important advantages. First, it allows the opportunity to examine the stock firsthand for color and figure. And second, it provides at least some assurance that in the hands of an expert kiln operator, a portion of this species' drying stress has been cooked out of the boards you buy. □

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