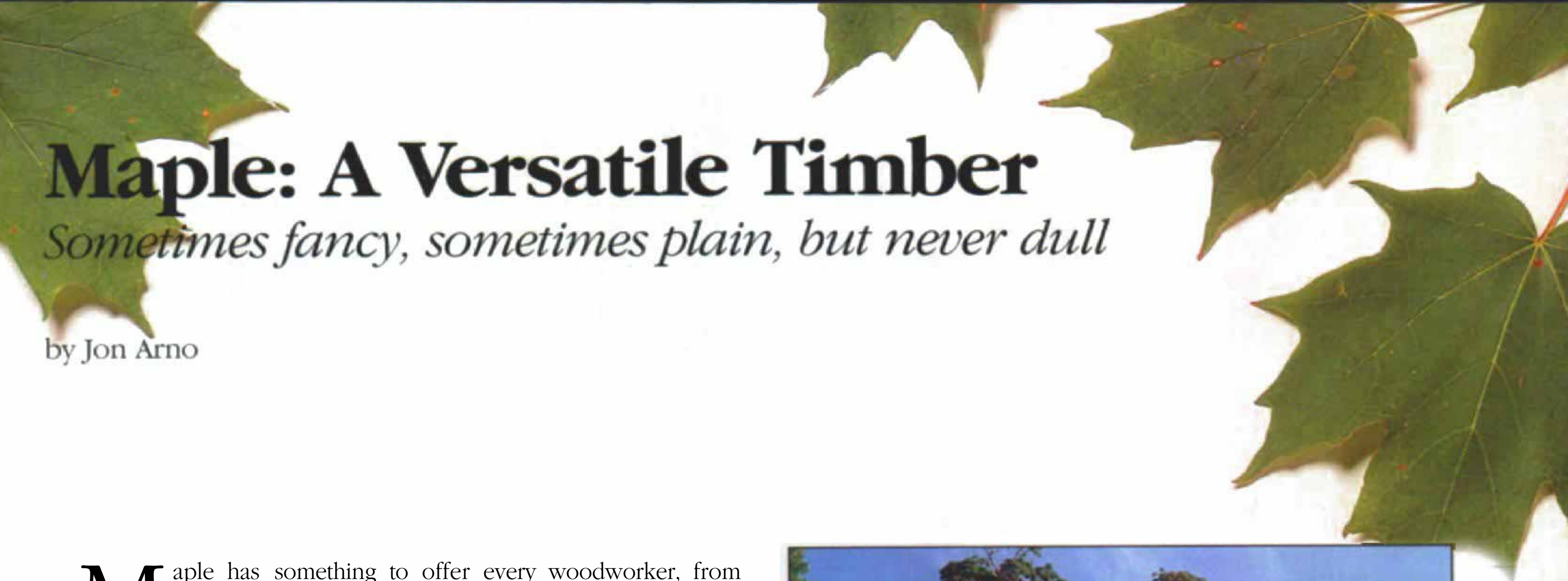


Maple: A Versatile Timber

Sometimes fancy, sometimes plain, but never dull

by Jon Arno

Maple has something to offer every woodworker, from general contractors to turners. Even though maple's inconspicuous figure lacks the striking contrast that gives ring-porous woods, such as oak and ash, their bold character, this diffuse-porous wood is subtly beautiful. Unlike colorful walnut or cherry, light-colored maple has warm brown accents and a translucent, opalescent quality in the way light plays off its surface. And most maple is easy to work and readily takes a finish, and can be used in anything from the finest furniture to packing crates, floors, bowling alleys and pins, cabinets, chairs and eating utensils.

Best of all, maple is exceptionally plentiful and often inexpensive. The latest USDA Forest Service statistics estimate that approximately 42 billion cu. ft. of maple stock (including both hard and soft maple species) is growing on timber lands in the Eastern United States. Most of it is relatively young second growth, but enough of it is of adequate size to produce sawtimber yielding more than 90 billion bd. ft. And this doesn't include stands of bigleaf maple in the Pacific Northwest, maple in unharvestable reserves, or both soft and hard maple available for logging in Canada. Of the commercially important hardwood cabinetmaking timbers native to North America, only the oaks are more plentiful than maple. Sugar maple, *Acer saccharum,* (the tree shown here), which is harder than most oaks, is the most common maple cabinetmaking wood; however, softer maples, such as red maple *(A. rubrum),* are also abundant and can be cost-effective substitutes.

There are about 125 species of maple distributed primarily in the Northern Hemisphere. About two-thirds of all these maples are native to China and the bulk of the remainder is spread out from England to Japan. North America claims only 13 native species and just 6 of these represent important commercial sources of timber. Despite the limited number of species, though, the United States and Canada provide the vast majority of the world's total production of maple lumber. Commercially, the lumber is divided into two groups: hard maple and soft maple, as given in the chart on p. 75.

This sugar maple growing on a hillside field in Connecticut is more than 4½ ft. in diameter at chest height and stands over 100 ft. tall. Wood from these trees is known commercially as hard maple.

Differences between hard maple and soft maple—Hard maple is stronger than soft maple and is better suited to woodwork that takes abuse, such as floors and countertops. Hard maple is cut from two closely related species: sugar maple and the less plentiful black maple, *A. nigrum.* The woods of these two trees, which grow in the Northeastern and Central United States and Southeastern Canada, are virtually indistinguishable in appearance. While black maple tends to be slightly lighter in weight, sugar maple has an average specific gravity of 0.56 (oven dry weight/green volume). Both hard maples are about as heavy as northern red oak and heavier than black walnut and black cherry. (For more on specific gravity, see Bruce Hoadley's book, *Understanding Wood,* The Taunton Press, 1980.)

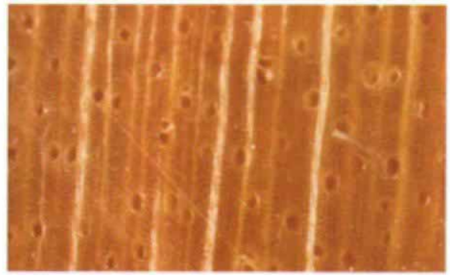
Even though all of the soft maples are substantially lighter in weight than hard maple (and therefore inferior for applications such as flooring), red maple really isn't all that soft. Its average specific gravity is 0.49, which falls midway between that of black cherry (0.47) and that of black walnut (0.51). When it comes to first-rate domestic cabinetwoods, that's pretty good company to be keeping. And red maple is more plentiful and usually much less expensive.

With a little careful selection, cost-conscious woodworkers can come up with some excellent wood among the soft maples. The key is choosing the right species for any given job, and soft maples are diverse enough to span a great many applications. Most of the

Which maple is which?

This 15-power macrophotograph of river birch endgrain reveals characteristics that are not visible to the unaided eye. The rays of river birch are narrower than the diameter of its largest pores.

Sugar maple has two size rays and the widest are as wide or wider than its largest pores. Sugar maple is the most common maple cabinetmaking wood. This species is also related closely to black maple.



Soft maples, such as the silver maple shown here, generally display more uniform ray width than hard maples. Distinguishing between species of maple, however, is difficult without chemical analysis.

Maple is so common that you usually know when you are looking at it. But of all the wood you could confuse maple with, birch is the most similar. Birch and maple have a long history of being used in the commercial manufacture of cabinets, and so they're often encountered—sometimes together in the same project. Both are fine-textured, light-colored woods and have similar working characteristics. Even when you look closely, you can see that both have relatively small, uniform-size pores that are evenly distributed.

With a little practice, distinguishing maple from birch is not difficult. Some cabinetmakers can differentiate the two by smell. When fresh, maple and birch have distinctly different scents, and you can train your nose to recognize the difference.

You can also see physical differences between maple and birch. Birch generally has a somewhat chalky, less-lustrous surface than maple, and birch has an ash-gray cast, while maple is often yellowish beige. If you look closely at maple's cleanly crosscut endgrain, you can see its medullary rays, which diverge from the center of the tree. On the tangential surface of maple, the rays appear as a profusion of evenly dispersed, very fine, dark brown lines that run parallel to the grain. Each ray is only about 1/64 in. to 1/32 in. long, but they're in such abundance that they lend a warm color to the wood. On the radial surface, the rays appear as distinct, narrow, amber-orange bands that run across the grain, occasionally 3/4 in. to 1 in. long if you're lucky enough to have cut directly through the ray. The rays in birch, however, are so fine and so similar in color to the background tissue that they are virtually invisible on either the tangential or radial surfaces without magnification.

To differentiate between maple and birch with certainty, you should examine their endgrain using a 15-power hand lens. Cleanly slice the endgrain of both samples with a razor blade and compare what you see through the lens with the three photos above of river birch, sugar maple and silver maple. In birch, the diameter of the largest pores is greater than the width of the widest rays.

It is extremely difficult, however, to distinguish between various species of maples (as you can see from the photos above, center and right). Some technical references report that soft maples have rays that are relatively uniform in width, while hard maples have both wide and narrow rays. Also it is possible to distinguish red maple from sugar maple by chemical analysis. When a water solution of ferrous sulfate is applied to the surface of these woods, red maple turns bluish-black, while sugar maple turns green. —*J.A.*

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grain patterns found in hard maple also occur in soft maple, but some of the soft maple species actually possess more interesting color. For example, the heartwood of red maple, which grows throughout most of the Eastern United States, is usually darker than that of sugar maple. It has interesting gray highlights and sometimes dark, chocolate-brown markings.

The softest and lightest soft maple is box elder *(A. negundo),* which is found throughout most of the United States. It's also the finest textured of the maples, making it very pleasant to work with and a favorite among turners. Bigleaf maple, a Western species, and silver maple *(A saccbarinum),* which is plentiful throughout the East, are the remaining two major U.S. timber-producing soft maples. Both of these species are relatively soft and easy to work, and they have the additional advantage of being much more stable than hard maple. In fact, bigleaf has an average volumetric shrinkage of only 11.6%, which is quite comparable to black cherry.

Maple's many faces-In most woods, figure is produced by variation in texture between the springwood and summerwood. In maple, however, the figure is produced by bands of warm-brown- or amber-colored fibrous tissue demarcating the annual rings from the wood's overall creamy yellow hue. Like the annual rings, the medullary rays in maple are much darker than the background tissue, and they pepper the tangential surface with short, thin lines, which are similar to the ray flecks in beech. But maple's rays are softer and more subdued, like the weave of shear fabric. Even plain-figured maple, shown in the top, left sample on the facing page, seldom produces absolutely straight grain and the figure on its tangential surface usually curls and contorts like the veins in fine marble.

In some instances, ordinary maple trees may produce extraordinary figures, which are commonly referred to as fiddleback, quilted and bird's-eye maple. Bird's-eye figure (shown in the top, right sample on the facing page) ranks among the world's finest and most sought after cabinetwoods. (For more on this, see "Bird's-Eye Maple," *FWW* #74.) Curly figure (shown in the bottom, left sample on the facing page) is sometimes called fiddleback or tiger-stripe maple and is often used for the back of stringed instruments, like violins. Quilted figure (shown in the bottom, right sample on the facing page), which occurs most often in the Western bigleaf maple, A *macrophyllum,* is prized for tabletops and inlay. Only a small percentage of maple woods brought to market have these

Photos this page: John P. Limbach, Ripon Microslides special figures, which are the result of abnormal growth. In some instances, the tree's living, wood-producing layer (the cambium layer, located just inside the bark) develops spots that fail to produce wood tissue at a normal rate. While this process may not affect the entire tree, it generally persists for years, as the spots enlarge and build up layer upon layer of convoluted grain. Depending upon the degree of malformation and how you cut the log, a number of distinct figures may be obtained from a single piece.

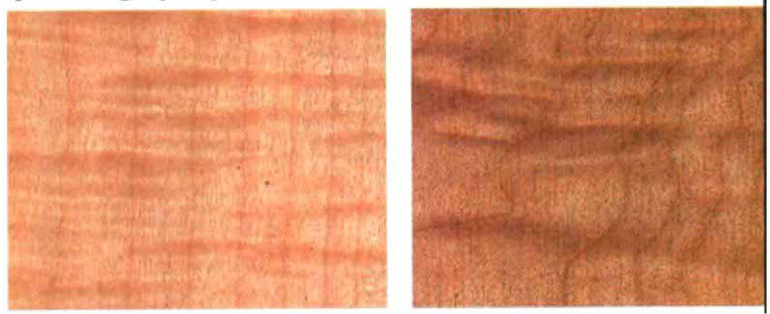
Machining and finishing maple—Plain-figured maple machines exceptionally well and will hold very sharp details. In fact, the latin name for the maple genus, *Acer,* means sharp because lances and skewers made from it held a sharp point. Plain maple's even grain allows it to be sawed, chiseled, handplaned or machine planed, or drilled without much chipping or tearout. When it is routed, it has a tendency to develop burn marks that are difficult to sand out, and so you must use a sharp, clean bit and keep your feed speed high. Because of hard maple's density, working it with hand tools requires some muscle, but the results are gratifying. Figured maple, on the other hand, can be very difficult to handplane or scrape cleanly, and it requires using a plane with a surgically sharp blade. Hard maple turns so predictably and yields such defect-free products that it has long been favored for commercial production of round items: kitchen utensils, bowling pins, furniture parts, dowels, spindles, spools and heavy-duty conveyor rollers. And when hard maple is sanded on the lathe, it doesn't gum up sandpaper as cherry does.

Few woods are as easy and as pleasant to finish as maple. It has a moderately high natural luster, and you can quickly smooth its surface with scrapers or fine-grit abrasives. Some soft maples can be more difficult to work to a smooth surface free of fuzzy grain, and they may require more sanding with fine-grit paper than hard maple. A single coat of tung oil on maple tabletops, counters and cutting boards may be sufficient protection against stains from food and drink spills. But bare maple does have adequate porosity to accept stain and allow glue to bond. Also, because of maple's fine texture, you can finish it to a high gloss without using special fillers. Only a coat or two of light-bodied varnish is needed to build up a glassy smooth surface. And since maple is so hard, it supports virtually any finish without a great risk of denting or chipping. (For more on working with bird's-eye maple, see Bill Keenan's article in *FWW* #74.)

There are no chemicals in maple that threaten its utility. Although there are minute traces of tannin in maple bark, it is absent from the wood. Volatiles in common varnishes, lacquers and glues don't react adversely with maple to destroy their bond or affect drying time. In fact, given its fine texture, maple is excellent for painted projects because its featureless grain won't telegraph through the finish.

Limitations—Given maple's pleasant working characteristics and subtle beauty, there is little mystery as to why it is used in so many diverse applications. But it is not suited to every purpose and indeed has some significant shortcomings. First of all, since hard maple is not very stable compared to most other popular cabinetwoods, woodworkers should prepare for wood movement. Hard maple's average volumetric shrinkage of 14.7% (green to oven dry) is nearly 30% greater than that of black cherry (11.5%) and almost twice as large as that of Honduras mahogany (7.8%). Hard-maple spindles and tenons tend to loosen when exposed to seasonal fluctuations in humidity. Furthermore, hard maple has a rather pronounced tendency to warp because it develops severe stresses when drying. Its high volumetric shrinkage is compounded by a somewhat large difference between its 9.9% tangential shrinkage and its 4.8% radial shrinkage.

Ordinary maple, ***above, left,*** *is subtly beautiful, but bird's-eye figure,* ***above, right,*** *is probably one of the most sought after cabinetwoods in the world. Figured maple woods are freaks of nature resulting from abnormal growth. Curly figure, also called fiddleback or tiger maple,* ***below, left,*** *is often used in stringed instruments. Quilted figure,* ***below, right,*** *occurs most often in bigleaf maple.*



Maples

Commercial Name/Species	Specific Gravity	Shrinkage(%) T	R	V
Sugar, *Acer saccharum**	0.56	9.9	4.8	14.7
Black, *Acer nigrum**	0.52	9.3	4.8	14.0
Red, *Acer rubrum***	0.49	8.2	4.0	12.6
Silver, *Acer saccbarimim***	0.44	7.2	3.0	12.0
Bigleaf, *Acer macrophyllum***	0.44	7.1	3.7	11.6
Box elder, *Acer negundo***	0.42	7.4	3.9	14.8

Specific Gravity = oven dry weight/green volume
T = Tangential shrinkage, green to oven dry
R = Radial shrinkage, green to oven dry
V = Volumetric shrinkage, green to oven dry
* Hard maple
** Soft maple

Another limitation is that maple has a low resistance to decay. Because maple lacks tannin or other strong chemical defenses often found in more durable woods, it is quickly attacked by fungi. On the positive side, though, the stains caused by fungi can produce a very attractive spalted pattern, which is actually prized for use in cabinetry and in turned decorative bowls. Spalted box elder can be especially nice. It is susceptible to attack by the fungus *Fusarium negundi,* which produces beautiful, coral-colored streaks, rather than the usual brown or blue-black coloration found in most spalted woods. Spalted wood, however, must be thoroughly seasoned as soon as possible after the staining occurs in order to force the fungi into dormancy. Otherwise, the wood will structurally deteriorate as the fungi multiply and literally devour the wood tissue. Unless producing spalted wood is your objective, maple should be dried quickly to remove all surface moisture, before the fungi can get established. Even when properly dried, though, maple is a very poor choice for marine or exterior projects of any kind. □

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