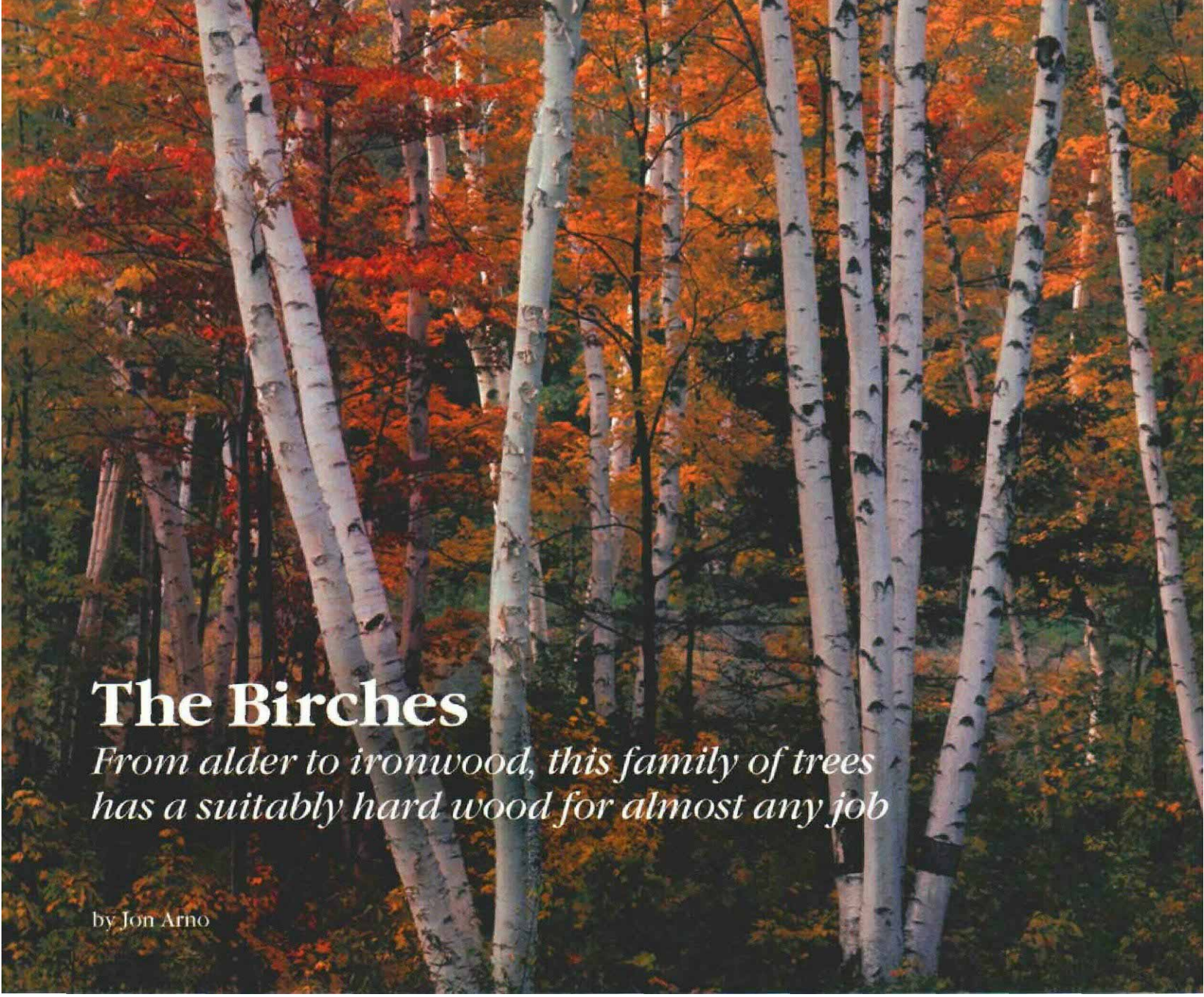

The Birches

From alder to ironwood, this family of trees has a suitably hard wood for almost any job

by Jon Arno

The brilliant autumn foliage of the paper birch *is a common sight in northern forests. Like all members of the birch family, paper birch has a light color and fine texture, but unlike the others, it produces very little high-quality lumber or veneer. Though easy to work, paper birch is softer and less lustrous than other members of the family.*

For me, the thought of birch conjures up pleasant memories of autumn canoe trips in the great north woods with my college buddies. I remember crisp days, clear blue skies and our canoe moving across the still waters. We slipped past the graceful white trunks of paper birch trees on the shore, their brilliant yellow foliage standing in sharp contrast to the dark green spruce trees.

The paper birch is an unforgettable component of our northern forests, and its value to American Indians and early European traders was immense (see the bottom photo on the facing page). Of all our native birches, this colorful species is the one most often used for landscape plantings. But paper birch is only one member of a large family. When it comes to the production of birch lumber and high-quality veneer, it's a minor player. Actually, the two dominant lumber sources in the family are yellow birch and sweet birch.

Woodworkers take considerable pains to distinguish between red and white oak and soft and hard maple. The birches tend to be lumped together, yet the woods produced by the birch family are more varied in terms of density and working

Photo this page: Dennis Stock/Magnum Photos

characteristics than any other botanical family native to North America, save the walnuts.

The birch family (Betulaceae) has astonishing range. At one extreme is red alder *(Alnus rubra).* native to the Northwest. It's almost as soft as white pine. Its fine texture, pleasant pinkish-tan color and easy working characteristics make it a popular lightweight wood for millwork and cabinetmaking,

At the other extreme is hop hornbeam *(Ostrya virginana),* better known as ironwood. Like all members of the birch family, hop hornbeam is very finely textured, but it stands apart from its kin in two respects. The horizontally oriented cells of hop hornbeam, called rays, are slightly larger than the rays in the other birches. On a cellular level, this gives hop hornbeam a woven, almost fabric-like, consistency. It is very difficult to split. Hop hornbeam is as hard as some of the hickories and exceptionally resistant to abrasion. These features made it a favorite wood in the 19th century for wagon-wheel hubs and mallet heads, but this brutally hard wood is probably too dense to be a viable cabinet wood.

A birch for every occasion

Birch is plentiful, and the supply is readily renewable. It grows easily in cool, moist climates, and the wind-borne seeds quickly restock cut-over or burned forest lands. Most species are short-lived, but they grow quickly. A great deal of birch comes from smaller trees and is milled into moldings or used to churn out stock turnings, such as dowels, glue pegs and spindles. However, many species are capable of attaining adequate size to be efficient producers of both veneer logs and saw logs.

Worldwide, the birch family contains more than 100 species, and most of them are sold as lumber, even if only in small quantities. These woods all share characteristics favorable to woodworkers. Their fine, uniform texture allows them to be planed, shaped or turned without difficulty. They all have a very low tendency to splinter when crosscut, and they hold routed or carved details exceptionally well.

The birches are far less susceptible to friction burns caused by dull cutters or improper feed rates than cherry or maple. Their even grain needs no fillers for a smooth finish. Birches accept virtually all

Photo: Gerald Martin

Flame-grained sweet birch is anything but dull, *unlike the grain highlights of most species of birch. Irion Company Furniture Makers in Christiana, Pa., darkened this cupboard with aniline dye and glazing stain to accentuate the grain.*

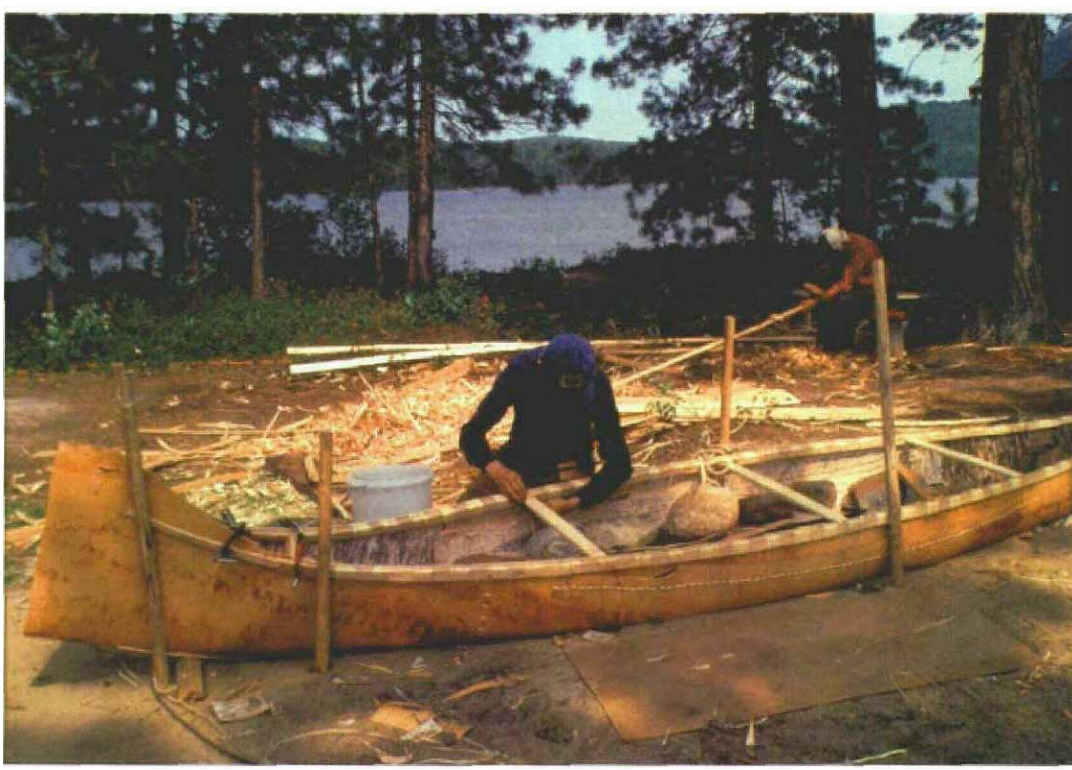

Photo: Henri Vaillancourt

The leathery outer bark of the paper birch is used to skin traditional canoes. *American Indians and early European settlers used every part of the birch tree for building canoes and snowshoes as well as for making medicines and sweeteners, They called the paper birch "mother tree."*

Red alder

Paper birch (also catted white birch or canoe birch)

River birch (also called red birch)

Yellow birch (also called shaggy birch)

Sweet birch (also called black birch or cherry birch)

Flame-grained sweet birch

Hop hornbeam (also called ironwood)

Worldwide, the birch family contains more than 100 species, and most of them are sold as lumber, even if only in small quantities.

adhesives and finishes without difficulty.

The birch family also shares a few limitations. Birch doesn't have very good weathering properties. It's susceptible to beetles and borers, and it doesn't possess the kind of ring-porous anatomy found in highly figured woods such as oak or ash. But this is not to say that all birch lumber is bland or lacking in figure (see the top photo on p. 69).

Despite the many characteristics shared by the birches, this family is nonetheless extremely diverse. Like a well-balanced Olympic boxing team with at least one contender in every weight category, there is a birch with just the right weight and strength for almost any application.

Lightweight birches—Red alder rivals yellow poplar, aspen and even white pine as an easy-to-machine, easy-to-finish and remarkably stable secondary wood. Alder actually shrinks less than yellow poplar and is substantially less prone to warping than yellow poplar or aspen (see the chart on the facing page).

Alder has two serious drawbacks. First, it's soft and not very durable. Second, fast-growing alder tends to contain reaction wood, which chips out when planed and gets woolly when sanded. Reaction wood can be identified by its dull-gray tinge.

Middleweight birches—In the middleweight category, paper birch *(Betula papyrifera)* ranks between domestic black cherry and black walnut in hardness. It's the whitest and blandest of the birches and has none of the stability, figure or attractive color of either cherry or walnut. Paper birch is inexpensive and machines well, so it's often used for turned parts such as knobs, spindles, dowels and pegs.

The wood of the shaggy dark-barked southern river birch *(Betula nigra)* is almost identical to that of paper birch. Although the tree is capable of attaining heights of 80 ft. and diameters in excess of 2 ft., it tends to branch out and produce knotty, low-grade lumber. But for small projects or turned parts, it is every bit as good as paper birch. When bought in a #1 or #2 common grade, it's hard to find a less expensive hardwood.

There may be other surprises in the piles of lower grade birch lumber. All birches are susceptible to attack by fungi, and boards showing stain are given a lower grade, even when knot-free. The stain is considered a defect in the lumber trade, but if it's vivid enough, it will yield a spalted figure with a special marble-like appearance. When you can find it, this spalted material is an outstanding choice for bowls and other decorative turnings.

Photos this page: Scott Phillips

Heavyweight birches—Yellow birch *(Betula alleghaniensis)* falls within the density range of the red oaks. This is the species most often used in commercially made birch cabinets and as the face veneer on cabinet-grade birch plywood. The subtle but flowing figure and creamy white color is accented by soft gray highlights. The wood is only slightly softer than hard maple, which yellow birch closely resembles.

In terms of working properties, yellow birch and hard maple are so similar they're interchangeable. But yellow birch is slightly less lustrous than maple. The ray flecks are comparable in color to the rest of the wood and not as pronounced as they are in maple. The two can be easily distinguished by examining the end grain with a hand lens (for more on this, see *FWW*#85, p. 74), but once you've worked with both, the lens is seldom necessary. They give off noticeably different scents when machined.

The birch family's second contender in the heavyweight category is sweet birch *(Betula lenta).* This Appalachian native, sometimes called black birch or cherry birch, is second only to yellow birch in annual harvest. Unfortunately, the trade seldom bothers to segregate the two.

Sweet birch is harder than yellow birch. It has the same average specific gravity as white oak and is rugged enough for virtually any furniture project. The sweet smell makes it a joy to work. Even well-seasoned wood fills a shop with its scent. The sap of this species is used for making birch beer; the bark and twigs are the source of wintergreen.

The highlights in yellow birch lean toward gray or, at best, a soft tan; those in sweet birch are a decidedly warmer orange-brown. Both woods sometimes rival maple in producing curly figure, but sweet birch's orange highlights produce what is commonly called flame grain. Of all the figures in birch, this is truly the connoisseur's choice.

Unlike the careful grading and marketing the trade lavishes on the choice figure of bird's-eye or tiger-stripe maple, fancy flame-grain birch seldom receives special handling at the mill. At the retail level, the bad news is you have to son through the pile to find it. The good news is that it seldom sells at a premium. □

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How the birches compare to other common woods

Species	Specific gravity	Volumetric shrinkage	T/R shrinkage
White pine *(Pinus strobus)*	0.34	8.2	2.90
Aspen *(Populus tremuloides)*	0.35	11.5	1.91
Red alder *(Alnus rubra)*	0.37	12.6	1.66
Yellow poplar *(Liriodendron tulipifera)*	0.40	12.7	1.78
Black cherry *(Prunus serotina)*	0.47	11.5	1.92
Paper birch *(Betula papyrifera)*	0.48	16.2	1.37
Black walnut *(Juglans nigra)*	0.51	12.8	1.42
River birch *(Betula nigra)*	0.55	13.5	1.96
Yellow birch *(Betula alleghaniensis)*	0.55	16.8	1.30
Hard maple *(Acer saccharum)*	0.56	14.7	2.06
Red oak *(Quercus rubra)*	0.56	13.7	2.15
White oak *(Quercus alba)*	0.60	16.3	1.87
Sweet birch *(Betula lenta)*	0.60	15.6	1.39
Hop hornbeam *(Ostrya virginiana)*	0.63	19.4	1.18

Source: USDA Forest Products Laboratory

Specific gravity is the ratio of a wood's weight to the weight of an equal volume of water. A wood with a high specific gravity will be heavier, harder and usually stronger and tougher to machine than a wood with a low specific gravity.

Volumetric shrinkage is the percentage of change in the volume of a block of green wood when oven dried to 0% moisture content.

Tangential to radial (T/R) shrinkage. As the wood dries, it shrinks in two dimensions: tangentially (parallel to growth rings and perpendicular to grain) and radially (perpendicular to growth rings). A ratio of those changes in dimension from green to dry is a way to express the overall tendency of a wood to distort. The higher the number, the more a wood will change dimensionally with changes in humidity.

Members of the birch family appear in red type.