To start a ball shape, rub the bevel on the line, roll the gouge and lift the handle. Start each successive cut a little closer to the center line, but don't move the tool along the rest during any one cut.

(flute up) to finish at the bottom of the cove. Do not go past center of bottom. Sometimes I will allow just a little way past so that this area cleans up nicely without ridging.

Reverse the directions and cut down from the left-hand line. If you do not attempt heavy cuts you can do these alternate ones nice and slowly, watching and feeling the cut working properly. Alternate cuts from side to side will deepen and shape the cove to your satisfaction.

The coving gouge, which many beginners think is just for hollows, can also form quite attractive ball shapes. Right at the full diameter it cannot finish as cleanly as the skew chisel or the beading and parting tool, but it can get quite near.

Make the usual practice cylinder, 2 in. in diameter between centers. Somewhere along cut down a groove to about ½-in. in diameter. To give room for the gouge to work, widen it to 1 in. in length. Repeat the process 2 in. away so that you are left with a 2-in. block with room to work at either side. Pencil a line around the center of the block. Then pencil two more so that the wood has three equidistant lines running around it. We will start work from left to right.

With the lathe stopped place the gouge on the wood with the point upwards at the right-hand line, the bevel straddling the line, and the flute up. Turn the lathe slowly by hand. Keeping the blade on the rest and at a right angle to the wood, slide the blade down the wood, keeping the bevel rubbing, until the point takes hold and starts a small cut. Keep this going by gradually twisting the blade over to the right while progressively raising the handle. This action continues until the corner of the block has become slightly rounded and the gouge comes off the cut. You will find that the gouge has to be rolled and the handle lifted a surprising distance to accomplish such a short area of cut.

Start the lathe and do a similar cut, increasing the rounded area. Do another with the lathe stopped, slowly so that you can feel how much more freedom and lift you have to give the tool to keep it going over each full cut. Then you can gradually progress back to the block's center line, increasing the rounded area down to the ½-in. short spindle. You are cutting from large diameter to small with the bevel rubbing all the time. Down at the ½-in. spindle, the gouge will have been rolled over so much in order to keep it cutting that the flute finally ends up facing completely right.

Ensure that whatever hand is on the rest does not move along at all during any one cut. Keep your tool bevels at the correct length, hollow ground or dead flat, and sharpen often. And above all, do not try to cut wood uphill. □

Cleaving Wood

Froe follows long fibers

by Drew Langsner

Many craftsmen today have little, if any, experience with the ancient practice of cleaving. Yet before factory-made saws became widespread, cleaving and hewing with an ax were the primary means of reducing wood in size or dividing it into smaller pieces. In cleaving, a tree trunk is split lengthwise into halves, then quarters and sometimes eighths or sixteenths, depending on the diameter of the log and the intended use of the wood. The resulting pie-shaped pieces are squared with a drawknife, then cleaved along tangents to the annual rings with a froe or knife into halves, quarters and so on. These tools allow the use of leverage to follow the grain, rather than a straight line, which a saw must do.

Cleaving has advantages over sawing. Because cleaved material follows the long fibers, it is much stronger than wood sawn by hand or machine. With cleaving, there is no sawdust, but more waste. Cleaved wood will take and hold bends better than sawn wood. And cleaving is faster than hand-sawing.

The crudest examples of cleaving are fence posts and rails, especially black-locust posts and oak rails, which are renowned for their strength and durability. At the other extreme are fine, yet very durable, baskets, woven from splints of white oak, ash, willow or hazel. Other traditional uses of cleft (or "rived") wood include shingles, wall lathing, tool handles, bucket staves, special dowels, "tree-nails" (pegs used in timber-frame buildings), ladder rungs, agricultural implements and small boat ribbing. The technique of cleaving also lends itself to carving projects and chairmaking.

Equipment

Cleaving requires a few basic tools. A peavey or cant hook is useful for maneuvering logs more than 1 ft. in diameter. A 6-lb. to 16-lb. wedging maul ("go-devil") or a sledge hammer, a heavy wooden cudgel, two or three iron wedges (a narrow timber wedge is handy), two wooden "gluts" (large wooden wedges) and a hatchet are useful for splitting the log longitudinally. Gluts are easily hewn from any straight-grained hardwood, usually saplings or limbs of hickory or oak. The beveled sides should be flat. Chamfer the edge around the head to prevent premature fraying. Gluts should be seasoned about one month before being put to use, lest they split and fray too easily. Gluts can be driven with a sledge or go-devil, but will last much longer when pounded by a wooden cudgel. A "brake," or hardwood crotch, holds the wood when the smaller sections are cleaved with a froe and froe club.

The design and workmanship of the froe are critical to its effective cleaving. A froe blade should be 6 in. to 10 in. long, and at least ⅜ in. thick. The cross section of a good froe has a narrow angled edge formed by slightly convex tapered sides beveled the full width of the blade. The back (striking) edge should be nicely rounded to minimize wear on the froe club. Froe eyes are forged or welded shut. The orifice must be

Hewing: With an iron wedge driven into the end of a white oak log (top left), wedges are leapfrogged along the cleft. Two 3-in. gluts and a dogwood cudgel complete the split (bottom left). Then quarters are cleaved into eighths with a pair of wedges and a 10-lb. go-devil (above). Note the splitting break at left, propped up by crossed saplings.

smooth. Froes with a tapered eye use a swollen handle, not unlike an adze or mattock haft. These seem to work loose just as easily as round eyes with parallel sides. The handle should be 1½ to 2 times as long as the blade. It may be any stout hardwood, cleaved of course, then well seasoned before fitting. A small wooden wedge should be dabbed with glue and driven into a slot sawn across the end grain.

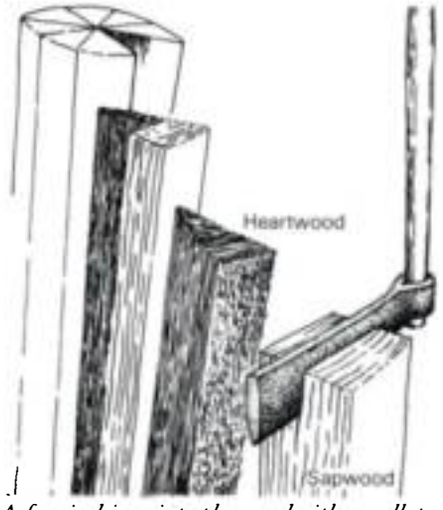
I have found that a long narrow club is most convenient for cleaving with a froe. A short fat club tends to be in the way. Froe clubs are made from almost any dense hardwood. I've used apple, hickory, dogwood and oak. Clubs made from green saplings and limbs generally check. To avoid checks, use a quarter section from a larger tree. The club (which is unavoidably expendable) should be seasoned a few weeks so that its surface hardens before it is used.

Woods

You can cleave a fairly wide range of deciduous and coniferous woods. For work that requires strong or tough materials, select oak, hickory, ash or locust. White oak makes fine splints and is used in many bending applications. Most other eastern oaks cleave nicely, except for maul oak and swamp white oak, both of which are almost impossible to split. Hickory, of course, is famous for toughness and ability to take impact, but it is rather stringy and sometimes hard to work (especially when seasoned). Ash is lighter and very nice to split. Locust cleaves easily, but the grain usually warbles, resulting in distorted splints that are "foxy" (uneven or brittle). Beech was preferred by English chair bodgers, the itinerant woodsmen/turners who traditionally made legs and rungs for Windsor chairs.

Among the softwoods, one can choose from pine, hemlock, cedar and redwood. Very fine-grained pine makes superior bucket staves, and sometimes excellent shingles. Hemlock cleaves very easily, though the grain may twist or warp. Its main use is tobacco sticks and tomato stakes. Cedar and redwood may be cleaved into shingles, or made into long-lasting fence posts and rails.

Short bolts of many other woods, such as apple, linden, walnut, dogwood and holly can be cleaved into chunks for



A froe is driven into the wood with a mallet, then worked along the long fibers by leverage. Long pieces of wood may be supported in a brake (far left); short chunks can rest on a stump (left). The diagram shows the cleaving sequence for basket splints. Heartwood is usually discarded; squared-off sapwood is split into halves, quarters, eighths and sometimes sixteenths. A froe makes the first cuts; finer splits are made with a knife.

carving, and bowl and spoon-making. Hazel is traditionally used for bucket hooping and basket materials. Willow rods make nice baskets, too. Until the blight, chestnut was often cleaved for fence posts and shingles.

Felling a tree

When choosing timber for cleaving, select straight-standing trees that are free of knots, scars, twists or other irregularities. White oaks for basket splints should be 5 in. to 8 in. in diameter, with minimal taper at the butt end. Trees with evenly spaced annual rings are preferred, but you can know this only if you have already taken other trees from the same site.

A large body of folklore suggests the ideal time of year, phase of the moon, and prevailing wind conditions for felling. A compilation of all this advice quickly leads to contradictions. My experience in felling trees at various times throughout the year has led to no conclusions whatsoever. I have cut white oaks for basketry that were of the same age and that grew side by side—I found one beautiful to work and the other only mediocre. In general, I recommend cutting trees for cleaving as near as possible to the time when the wood will be worked or used. Oak shingles, for instance, should be rived out and installed green; seasoned shingles may warp or split while being nailed. An exception would be where well-seasoned material is needed, such as for bucket staves, in which case the wood should be bucked and cleaved into quarter or eighth sections whenever possible.

For reasons of esthetics and conservation I prefer to fell timber as close as possible (almost flush) to the forest floor. Discard the lowermost section of stump if it's tapered or punky. Buck the log into bolts. Length depends on intended use: from 20 in. for shingles to 10 ft. for fence rails.

Cleaving the log

Using a wedge and maul, score a radial line from the central pith to the bark. If the wood is already cracked, you must follow along the cleft, because it's impossible to control cleaving once the integrity of the annual rings is broken. I begin by driving a wide, flat timber wedge into the end grain, but one can use a regular splitting wedge. In either case, the first wedge will open a cleft along the bark.

Insert a splitting wedge and drive it within an inch of its head. The cleft will lengthen as the wedge is pounded into place. Place another wedge into the cleft where it's ⅜ in. to ⅝ in. wide. Again, drive to within an inch of the head. Leapfrog the wedges one past the other until the end of the log is reached. Occasionally a wedge will stick in place. Tapping the sides of the head to the left and right will usually free it.

At this point small or easily cleaved logs simply break apart. Tougher logs require a pair of gluts. When inserting a glut try to find a place free of cross fibers. More gluts are ruined when the leading edge intersects cross fibers than by damage caused by pounding. Leapfrog gluts from one end to another, as with iron wedges.

If the log still isn't halved, roll it over and look for any incipient cracks on the reverse side. Sometimes it's necessary to clear off bark with a hatchet before any fissures are located. Drive wedges or gluts into the back side. The log should divide into halves, although it may be necessary to sever stubborn cross fibers with the hatchet. I prefer to do this kind of hatchet work two-handed. Be careful not to strike implanted iron wedges.

Follow the same procedure for cleaving quarter sections and eighths, if the bolts are still too heavy to haul to the shop. Green worked wood should be left in sections that are as large as possible, because small segments dry out much faster. Big sections, however, check more as they dry. Wood should be removed from the forest floor. Many species are subject to invasion and attack by fungi and insects. Ambrosia beetles infest and ruin oak felled in the spring and summer.

The next step is cleaving the radial sections. Most craftsmen hold the wood in place with a brake, a narrow crotch from the trunk or branch of almost any suitably shaped hardwood. The brake may be lashed to posts driven in the ground. Or lay the

big end across a log and support the legs with two saplings placed opposite each other, each one running beneath the near leg and above the far leg. The saplings work against each other, and the device is surprisingly rigid and self-supporting. Insert the wood into the brake. Place the froe crosswise at the approximate half-way point, or along the division of sapwood and heartwood. Strike with the club. Once the blade is in, rotate the handle downwards. One may have to strike the protruding blade again but usually the cleft opens and the froe is simply slid downwards. With tough wood I sometimes hold the split open by placing a stick into the wide end of the cleft. If the cleft starts to run out (divide unevenly to one side) rotate the piece 180° and continue to work from the other side. For thinner pieces, subdivide each bolt in half until you reach the required thickness. Attempts to cleave into uneven pieces, such as thirds, will usually fail. One can sometimes save a wild split by reversing the wood and starting again from the other end. The splits should meet, but it may be necessary to separate the two halves with a knife or hatchet.

Basket splints

White oak splints for basketry should be made promptly after the tree is felled. If this cannot be done, submerge the bole under water, but use as soon as possible. Five to six feet is about the maximum length for fine cleaving and weaving basketry. Cleave radial sections 1 in. to 2 in. wide. Split off the heartwood. Remove the bark with a drawknife, and shape to a square or rectangular cross section. Cleave in halves and quarters tangent to the annual rings. Once the wood is reduced to a thickness of about ½ in., it becomes possible to use a knife rather than the more awkward froe. To start, work the knife across a corner of the end grain, or tap in with a light mallet. Twist (rotate) the knife to open the cleft. As soon as possible, insert both thumbs into the cleft and place the second joint of your index fingers externally just below the cleft. Begin to pull the splint apart by using successive knuckles as a fulcrum while pulling your thumbs away from each other. This process requires a "feel" that comes with practice. If the splint starts to run out on one side, pull down and harder on the other side. Sometimes the wood fibers must be pared with a knife to keep the splint running evenly.

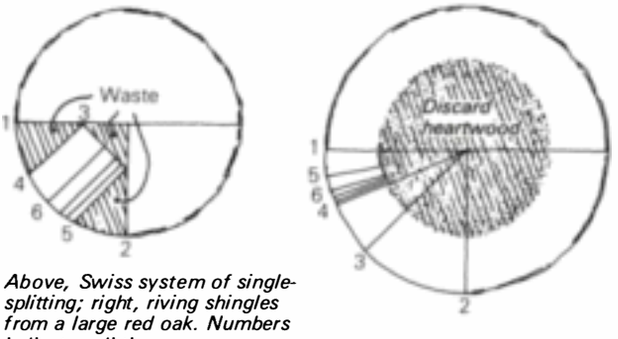
Good white oak will cleave to less than 1/16-in. thickness. The splints may be smoothed with a spokeshave, scraper or penknife. They are sorted and tied in bundles, and may be stored until needed.

Shingles

Shingles may be split from conifers (especially cedar, redwood and some pines) or hardwoods (generally red oaks). The tree diameter can be as little as 12 in., but 24 in. or more is much better. In any case, the wood must be straight-grained and free of knots and other imperfections. First crosscut into bolts of desired length, usually 18 in. to 24 in. There are several methods of proceeding. Swiss shinglemakers often use fine-grained 12-in. pines. They halve and quarter the bolts, then split off the heartwood and thin pie-shaped segments on the sides, to form a square bolt, which is usually split into halves, quarters and eighths.

With a larger hardwood bolt, the circumference can be divided into equal segments (3½ in. is excellent), then split into halves, quarters, and then the smaller sections. Any wavy or twisted heartwood is discarded. If the resulting segment is more than 5 in. wide, it is split in half. Each squarish section is split into 16 shingles.

Top left: White oak stick supported by brake lashed to two posts is worked into basket splints. Then thin splints are held between the knees and further divided. A small knife opens the cleft (top right), then the pieces are pulled apart by inserting the thumbs into the cleft and sliding the fingers down the outside (bottom).



Above, Swiss system of single-splitting; right, riving shingles from a large red oak. Numbers indicate splitting sequence.

In either case, the individual shingles are split across the annual rings. Parallel split shingles will warp unacceptably. Place the froe in the exact center of each segment, or it will run out, resulting in uneven shingles and too much waste. Most shinglemakers use a brake to hold their wood in place, but in Switzerland a leather knee pad is used to hold the material against a knee-high bench. Most shingles need dressing out—curves and bumps must be smoothed before installation. Smoothing is usually done on a shaving horse, using a sharp drawknife. The shingles should be tied into very tight bundles (use a vise to press them together) if they are not installed immediately. □

Drew Langsner, of Marshall, N.C., apprenticed with a Swiss cooper. His most recent book is Country Woodcraft *(Rodale Press, Emmaus, Pa.).*