

# SEEING THE WOOD FOR THE TREES

Despite playing a key role in wine production—and being referenced in many a tasting note—oak is rarely discussed in great detail. After visiting Tokaj in Hungary, one of the world's principal sources of high-quality oak, **Jim Clarke** argues that it's time to think more about its complex production and terroir

Oak, in a shallow way, gets a lot of attention from wine drinkers. As it should; almost every premium red spends some time in some sort of oak barrel; premium whites, too, albeit with more exceptions—Riesling, most notably. But the language of oak, as we learn it, is relatively simple: source (French, American, Hungarian), percentage new, size of barrel, and perhaps toasting. Occasionally, a producer highlights in its literature the cooperage from which it buys its barrels, which sounds good. It's certainly easy to understand that it makes a difference; it's often harder to grasp what creates that difference, because it reaches most of us at the level of branding, at best.

Recently, the demand has been for “less oak,” especially for Chardonnay, but for reds as well. It sounds simple, but “ideal oak use,” if there is such a thing, is a moving target. Winemakers have to adapt; cooperages, too. For example, in 2011 the Chêne & Cie group, which includes cooperages in France (Taransaud), the USA (Canton), and Hungary (Kádár), announced the results of a study they conducted in reaction to the rise in alcohol levels seen in many wines. It turns out that alcohol, as a solvent, encourages greater extraction, particularly of toast-derived aromas—smoke and roasted notes—and ellagitannins, which can be absorbed into the aging wine, affecting its color and structure. That research led to reassessment of their toasting process and their wood seasoning, during which ellagitannins



All photography courtesy of Kádár



can also be broken. A study like that involves a great many variables, because wines of varying alcohols are aged in barrels from different sources, with different seasoning and toasting regimens. And as with wine, if you try out something new, you have to wait a year or more to see the results and, then, for the next harvest before you can apply it.

We don't consume barrels they way we do food and wine, but it's still an agricultural product, and one that requires transformation for it to become useful, much as grapes must be guided through several stages before they become a finished and enjoyable wine.

While all the scientific names sound exactly precise, in fact oak trees are very prone to hybridization

#### A Hungarian revolution

Right now, Hungary is a particularly interesting place to observe the process, one that's recently witnessed a great deal of change. Just as Tokaj recaptured Western attention after the end of Communism, so did Hungary's cooperages; and just as outside interest and investment led to a reconsideration of winemaking in Tokaj, in some ways breaking it down into its components and then reassembling it (I'm thinking of Tokaji Aszú wines in particular), so has the art of making wine barrels in Hungary undergone a reevaluation.

Only a handful of cooperages, in fact, survived the "spontaneous privatization" of the 1990s. Budapesti Kádár was one of them, thanks to outside investment in 1993. According to current board president Peter Molnar, the company originated as a cooperative in 1951, the result of forced collectivization under Communism. With stainless steel a rarity in the Soviet Bloc, barrels were used for a variety of things: pickling, leather tanning, paper-making—"anything with acid." He says that made for highly skilled coopers, able to work with a variety of shapes and sizes but with little knowledge of the demands of modern winemaking. That came from outside, after the fall of Communism. Today, it is the country's leading cooperage, sourcing its wood from the Tokaj forest in the north of country, milling and seasoning the wood there, and then coopering it in Budapest itself.

Examining and determining the characteristics of their native oak forests was a major priority in assessing the virtues and strengths of their barrels. One such virtue, often attributed to Hungarian oak, is that it's the same species as French. But this suggests a false uniformity to French oak, especially since in English the word "species" lacks a plural form; French oak in this context actually embraces two species: pedunculate (*Quercus robur*) and sessile (*Quercus petraea*) oak. The two are collectively contrasted with the *Quercus alba* of North America. What

they all have in common is a long, narrow trunk. These are not the broad oak trees that one imagines adorning a hilltop alone, providing shade for a lazy summer picnic.

It's worth pointing out at this point that *Quercus alba* is known colloquially as "white oak," but that the same term is used to describe the *Quercus* section of the *Quercus* subgenus of oak, which embraces several dozen individual species, including all three species used for wine barrels—*Q. robur*, *Q. petraea*, and *Q. alba*. To make matters worse, *Quercus frainetto* is sometimes known colloquially as "Hungarian oak," though it is more typically found in Romania and Turkey and is not used for coopering anyway.

While all the scientific names sound exactly precise (if also confusingly similar), in fact oak trees, and those in the *Quercus* section of the *Quercus* subgenus ("white oak" in its broadest meaning) in particular, are very prone to hybridization. (Dare I suggest they're "Querky" that way?) The two European species, *Q. robur* and *Q. petraea*, could therefore share up to 50 percent of their genetic material within a given population (such as a forest). In French forests used as coopering sources, this hybridization is common. Limousin oak, for example, is generally considered to be looser-grained because *Q. robur* predominates, whereas Tronçais is primarily *Q. petraea*. In both cases, the two species grow alongside each other, so while an individual tree may be identified as one or the other, their characteristics intermingle.

That's in France, the western end of a broad band of oak that extends across Europe to the Carpathian Basin and on into Georgia, essentially following the southernmost edge of the last Ice Age, approximately 10,000 years ago. The glaciation of that period pushed these white oaks out from areas farther north and left behind soils basically well suited to both species. In the Carpathian Basin, however, conditions evolved that encouraged the two to remain more distinct. While forests once stretched across the basin, the area is now grasslands, with oak-growing areas separated and isolated from each other surrounding it on either side. While the south and north edge of the basin are both, almost by definition, hilly or even mountainous, the south side is warmer, wetter, and more fertile—conditions that favor pedunculate oak (*Q. robur*), with varying, smaller proportions of sessile oak (*Q. petraea*) growing (and hybridizing) there as well. That band continues on as far as the Caspian Sea.

Sessile oak, on the other hand, is more tolerant of cold and drought and thrives in rockier, less generous soils—the "petraea" in its scientific name owes itself to that predilection for stoniness. The northern edge of the Carpathian Basin is colder and less wet, so that band of forest is predominantly sessile oak; it traces a line over the northern edge of the basin and eventually peters out at the Dnieper River.

Within that northern band, the Tokaj forest extends north and east from the better-known vineyards. Its hillsides are the result of about 1,500 volcanoes that erupted into an inland sea 4 million to 8 million years ago. This has been covered by just a few feet of topsoil, but underneath is almost entirely andesitic tuff, providing the requisite stoniness. The area receives little summer rainfall but more snow than

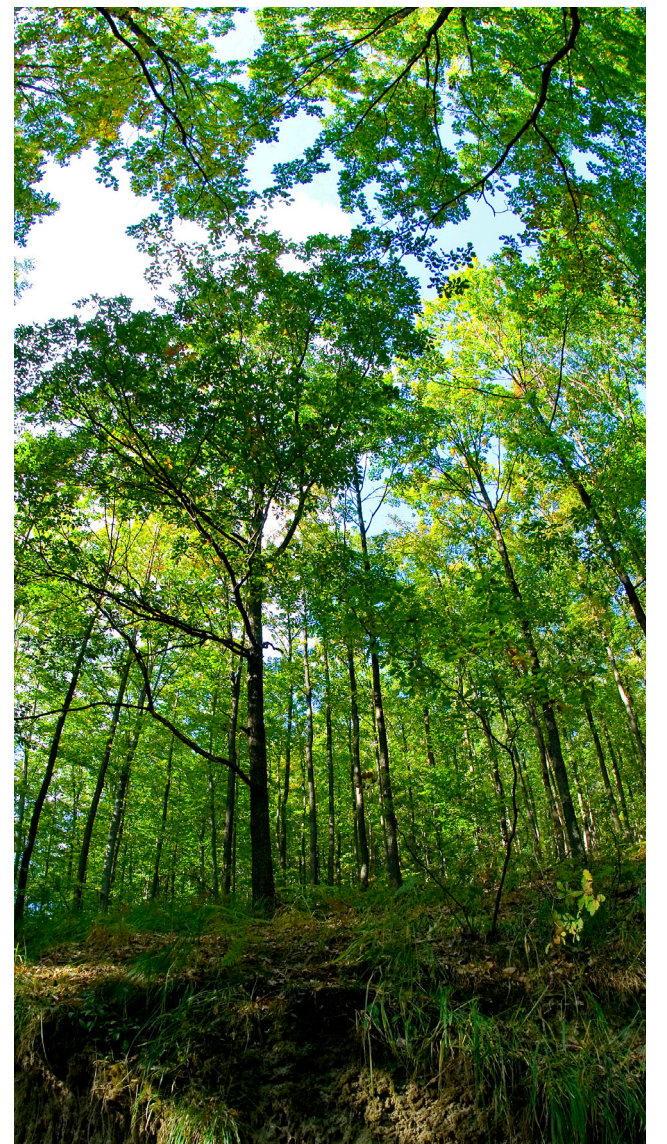
on the southern side of the basin. "This is the rockiest, most mountainous oak-growing region used for barrel production that we know of in Europe," says Molnar. "We've looked at it through our collaboration with the Taransaud group, who know France very well." The forest, consequently, is 90 percent sessile oak, a higher proportion than anywhere else in Europe except perhaps Tronçais, where estimates place the proportion of sessile oak somewhere between 73 and 90 percent. These slow-growing, dense, tight-grained trees are extremely well suited to barrel production.

An oak tree must grow for about 100 years before it can be used for barrelmaking; it earns the landowner nothing all that time and will provide enough wood to make two barrels at most

#### The longest term

Those conditions explain why Tokaj is a good place to grow oak, but they don't give a picture of what it means to farm oak for coopering. Long-term land management is vital. A cooper must laugh when he hears a wine grower talk about planting vineyards "for my children." While value, in terms of quality, may come from old-vine plantings, the vines will nonetheless be productive annually for many decades. An oak tree must grow for about 100 years before it can be used for barrelmaking; it earns the landowner nothing all that time, and when it is felled it will provide enough wood to make two barrels at most (in Tokaj; larger French trees may supply enough wood for three). Replacement plantings will then be ready a century later; at best, oak is planted for one's children's children. This need for long-term planning accounts for the high degree of government involvement and regulation in forestry. In Hungary, today's regulations date back to the Forestry Law of 1769, enacted by the Austro-Hungarian Empress Maria Teresa. These laws, which more or less survived Communism, established a 100-year cutting cycle in keeping with the trees' growth and are designed to assure sustainability. France has similar laws in place.

Forestry is not unique to barrel production, of course, but there are special considerations for a tree destined to become a barrel. It's not as passive as the above might suggest; one does not just plant a tree, wait, and allow one's descendants to fell it when it reaches its proper size and age. Cooperages cull their forests yearly. At several points in its life, each oak risks removal if it is diseased, or twisted. A tree might twist as it grows, in an attempt to reach more sunlight; and if it does so, it won't yield straight, unleaking staves. Or should a passing deer rub its antlers against the bark of a young tree, it will likely develop a knot at that spot and render the tree, or at least that section of the tree, unusable.



Slow-growing Tokaj oaks, which even at 100 years old may be only 12in around; András Kalydy, managing director at Kádár, situated in the Valley of the Coopers







The barrelmaking process at Kádár: Logs are seasoned for two to three years in the open air outside the mill (top and second from top), before being quartered and sawn into staves (third from top) and then carefully toasted (bottom)

All this time, the trees are growing slowly, developing that tight grain the cooperage desires. That tightness comes with slow growth; even at 100 years old, a Tokaj oak ready for felling might be only 12in (30cm) in diameter. According to Molnar, tests conducted in France found sessile oak from the Tokaj region to be 30 percent denser than any other oak they've measured.

They fell the trees in winter, when the wood is driest (most of the sap retreats into the roots) and skid them out with horses, to avoid the erosion that road-building would create. Coopers can only use the main, lower trunk of the oak; branches create knots that would eventually mean leaks were they used for barrels, so at the stave mill the rest of the tree is cut away and sold off for other purposes. Much as wine growers keep track of which blocks their grapes come from, coopers begin tracking the logs and, from that, the individual staves.

### Splitting and sawing

The mill quarters the logs and then splits them into staves. The bark and sapwood (the outer rings, which until recently conducted sap and nutrients up and down the tree) are cut away, and the rest is broken down into staves. It's often related that American oak can be sawn, whereas European oak must be split; the difference lies with membranes within the tree's vascular system called tyloses, which can open or close to obstruct the flow of water when needed—typically, when the plant is stressed by drought or disease and needs to retain its water. They also close up more or less permanently as sapwood converts into heartwood, and they do so almost completely in American white oak; in sessile oak, on the other hand, less than 10 percent of the capillary vessels will be fully closed by tyloses. So, one can saw American oak and still have wood that won't leak, since the tyloses will prevent wine from working its way along the capillaries. Sawn European oak (sessile or pedunculate) would risk long, diagonal leaks running throughout the stave. Splitting European oak instead separates the staves parallel to the wood's grain; many fewer vessels will be exposed, so the tyloses won't be called on to stop the seeping of wine through the wood. For much the same reason, the staves are also split lengthwise along the rays—cells that radiate outward from the center of the tree to transport water and nutrients horizontally. These cells then become the surface of the stave. High technology—laser guidance, for example—has become an important part of the stave mill, but there's still a large measure of craft to it. Unusually, most of the workers at Kádár's stave mill are also trained coopers, the hope being that their understanding of the eventual use of the wood will inform their preparation of the wood.

The staves will spend the next two or three years stacked outside the stave mill, seasoning. Drying out the wood is a small part of this process, but if that were all there was to it, they would be all but ready within ten months. In fact, accelerated, artificial drying is possible, affordable, and often used in the USA for staves intended for bourbon production. But seasoning the wood for wine-barrel use is more complex;

to draw a (loose) winemaking analogy, this is more fermentation than aging. At least three different bacteria species and three different fungi are involved in metabolizing the wood, converting its compounds into more complex elements that will eventually contribute to the wine's aromatic and flavor profile and structure. Simple examples of this process include the reduction of bitter components such as coumarins and ellagitannins, as well as the intensification of aromatic compounds like eugenol.

The needed microorganisms proliferate in the presence of certain plants and soils and require a certain amount of moisture, so the seasoning process varies depending on where it takes place. Locating Kádár's stave yard in Tokaj—specifically in the Kádárok Völgye ("Valley of the Coopers," reflecting the area's long history of barrel production)—is one of the changes that came after the company partnered with Taransaud, and the choice of location is intended to encourage that microbial activity. The same moisture that encourages botrytis in the vineyards, derived from the network of small rivers, marshes, and oxbow lakes that dominate the area's lower elevations, also promotes the needed bacteria and fungi in the wood; one such river actually runs alongside the stave yard. The rows of stacked staves are also oriented to the prevailing winds and rotated regularly so that all the staves experience the same exposure to the elements, encouraging consistency.

### A cooper's tale

We often use the word "cooperage" metonymically to denote a barrel-producing company, just as "winery" often means "wine producer". Both, in a more restricted sense, mean the actual building wherein the barrel—or wine—is made. Unlike wineries, and unlike stave yards as well, it's not terribly important where a cooperage is; once oak staves are seasoned, they're readily transportable, so there are, for example, cooperages in the USA assembling French oak barrels. In that context, Kádár's cooperage in Budafok, a neighborhood of Budapest about three hours from Tokaj, is relatively close to the forests and stave mill.

Budafok has a long association with the Hungarian wine industry, largely because the hills north of Budapest along the Danube used to have their own vineyards, once devoted to sparkling-wine production but now almost entirely gone. Today, only a handful of producers are still based in Budafok, though some still store wine there. The neighborhood is also home to one of the world's largest wine barrels, a monster 5.8m in diameter that is capable of holding 122 hectoliters of wine that was built for the Hungarovin company in 1974.

Kádár's facilities are more modest. Visually, coopering is probably the most familiar step in a barrel's birthing process, the staves—28 or so of them—arranged into a hoop and sticking to form a "rose," which is then toasted to bend the staves into the curved barrel shape and then toasted further. At Kádár, the preference, based on their research, is for long, slow toasting: 15 minutes of preheating, 15 minutes spent bending the staves, and then 40 minutes spent just with toasting. Should the same regimen be used at every

cooperage? Not necessarily. Just as winemakers work with the grapes they receive, so coopers respond to the character of their wood. But there's no question that more control of the toasting process is beneficial—and challenging. The variables are numerous: the fire's intensity, the shape and height of the basket containing the fire, the ambient temperature and airflow in the room, and how the water—used to cool the wood during the toasting and bending process—is applied. Kádár addresses one of those variables by attaching a monitor, developed in collaboration with a professor in Budapest, to the barrel, allowing them to observe not just the temperature of the fire basket doing the toasting but also the temperature of the wood itself as it is being toasted.

Consistency is the goal—across the surface of the barrel, barrel to barrel, and even within the staves. If the toasting does not sufficiently and evenly penetrate the wood, the contribution the toasting makes to the aging wine will change in proportion to that of the other aromatics and tannins coming from the wood. Normally, all the aromatic contributions a barrel might make, either from the wood itself or from toasting, fade over about five years; if the toasting doesn't sufficiently penetrate the wood, a majority of its aromatic contribution could be gone after the barrel's first use, creating an imbalance between toasting and wood aromas.

When it comes to a barrel's effect on wine, size is one of the more obvious and discussed factors. Usually thought of in terms of surface area versus total wine content, it's also fairly standardized. Typically, barrel shape is even less variable; Kádár, however, recently developed an upright, egg-shaped barrel with a domed head, inspired by the concrete "eggs" that some winemakers have embraced for the convection currents the shape encourages in the aging wine. That shaping, just like the toasting and the rest of the barrel assembly, is done by hand, providing a special outlet for the coopering skills carried over from the Communist era.

There is no single perfect barrel at the end of all this; different wines will call for different sizes, different toasting levels, even different shapes. Kádár offers a number of variations for a reason. Nor will Hungarian oak displace French in a big way; total sustainable production for the Carpathian Basin tops out at 20,000 to 30,000 barrels annually, compared to over 400,000 barrels from France. But over the past 20 years, Hungary has changed from being a cheap alternative to an oak source definable in its own right and with its own style; Chêne & Cie is not the only French company to regard Hungarian oak as a necessity in its portfolio. Isolated as it is from the forests of France, as well as from the other oak forests of the Carpathian Basin (never mind the *Quercus alba* woods of Missouri), the Tokaj forest makes an intriguing object lesson on the terroir of oak. Hungary was supplying barrels to Bordeaux as early as the 1700s, and medieval records indicate that coopers were working in the area several hundred years before that. The oaks are still growing, and the Valley of the Coopers is an old, old name. ■