

corkscrewed

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threatening an entire ecosystem.

HABITAT

By Susan McGrath Photography by Francesco Lagnese

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At day's end, a tractor departs a cork-oak savanna, known as a *montado*, hauling a load of cork planks. The cork is too valuable to be left out overnight.

Senhor Zé's cork crop matured this spring.

Eleven years have passed since the last harvest—the customary 10, plus an extra on account of drought—and the silvery charcoal oaks are swollen with cork so thick and dense it splits to accommodate its own girth. A crew of 33 has been working since early June on this 5,000-acre estate. The men have a month down, a month to go. Coming upon them out here on the sunny hillside, among the low, open-crowned oaks and the aromatic rockroses, far from farm building and blacktop, the little troop seems a natural part of the landscape. They flow from tree to tree, working them over the way a flock of songbirds does.

Tiradores—cork strippers—work two to a tree, swinging their small axes from the elbow hard and fast with a rhythmic, cork-muffled *thwack, thwack, thwack*. A good tirador cuts precisely through the outer bark and no deeper, slicing a narrow door-size rectangle into the broad side of the tree. For the final few cuts, the tirador chops and pries, chops and pries, twisting under the waxy bark in a squeaky-shoe counterpoint to the cut. *Thwack-squeak, thwack-squeak*. He discards the axe, grabs the turned-up corner with two hands, heaves back, and the plank slowly rips away from the trunk with a long, reluctant, scratchy groan. When all the bark lies below the tree in stiff curls, the men shoulder their axes and the eucalyptus-pole ladder and move on after the rest of the flock.

Exposed, a newly fleeced cork-oak trunk is a startling yellow-orange, with the grainless texture of a slab of gyros on a spit, only wonderfully cool and moist. This paler color will redden in a day or two; the inner bark will seal itself and take on an opaque, stuccoed look, as if finely plastered in paprika. As the years pass the bark will thicken and darken once again, to reddish mahogany, to chestnut, and back to silvery-charcoal gray.

All is quiet in the tiradores' wake. A honey-yellow butterfly makes the first move, ascending from a rockrose like petals taking flight. There's twittering from the crown of a tree. Small birds flit invisibly among the oak leaves. Finches drop to the wild oats—*verdilhões*: green finches, I think. A European nuthatch steals down an orange trunk. A nuthatch is a common sight in the *montados*, as these ancient Portuguese cork-oak savannas are called. And common is precisely the point, says Domingos Leitão, an ornithologist with the Portuguese Society for the Study of Birds. "Birds that are declining or rare elsewhere in Europe are still common here in the cork-oak montados of southern Portugal," he says. "Common and abundant."

"Because the native cork-oak woodlands around the western Mediterranean were never completely cleared, they still have some of the richest biological diversity in the Mediterranean," says Jose Tavares, Portugal program manager for the U.K.-based Royal Society for the Protection of Birds (RSPB). More than 100 songbird species breed in the montados, he says, including the brilliant, hummingbird-like bee-eaters; hawfinches and chaffinches, with their seed-cracker bills; and big, azure-winged magpies, little rock buntings, and curl buntings. More than 160 other birds occur here, including many species that overwinter, such as lapwings and golden plovers; millions of wood pigeons and doves, from all across Eurasia; booted eagles and short-toed eagles, honey buzzards and black kites. A handful of very rare species find refuge here, too. Iberian mixed oak forests support the majority of Europe's Bonelli's eagles (now numbering fewer than 1,000 pairs), the last 180 breeding pairs of Spanish imperial eagles, and fewer than 100 Iberian lynx. Cork-oak forests across the Mediterranean, in Algeria and Tunisia, harbor some of the world's last Barbary deer.

Laws of one kind or another have protected Portuguese cork oaks since the year 1259. As a result, montado still covers 1.7 million acres here, mostly in the Alentejo region of southern

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Portugal. But it would be a dangerous mistake to assume that abundance today assures the montados' safety in years to come, conservationists say. The slow-growing cork oaks are the "gold of Portugal," a tirador told me. They've been preserved because they provide an invaluable source of income for the farmers who own them. But 70 percent of cork revenues come from the wine industry; flooring, insulation, and cork's myriad other uses barely pay their way. And now, increasingly, the wine industry is turning to alternatives to cork.

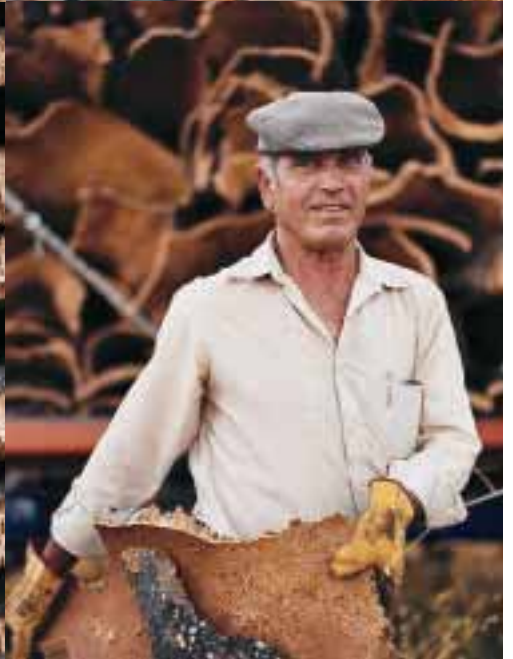
The change is happening at a full gallop, experts say. Synthetic and screw-top stoppers are no longer embarrassing hallmarks of plonk. They're commonplace on mid-range wines these days and not unheard of for the kinds of wine that come to the table with a tuxedoed entourage and an ice bucket. These are fearsome competitors because they are far cheaper than natural cork stoppers, more uniform, not as subject to "cork taint," and the beneficiaries of sophisticated international marketing campaigns (some wine-industry literature now refers to natural corks as "wood-bark stoppers"). If cork loses the wine-stopper market, Portugal's gold will turn to dross. It's not hard to predict what will happen then. "Yes, the corks are protected," Leitão says. "But that can change very quickly if their value drops away. We are trying to face it before it becomes an emergency. The artificial stoppers can swallow up the cork market before people even notice them coming."

Through the centuries, Senhor Zé's cork farm has witnessed fire and drought and overgrazing; wars, revolution, land collectivization, and land restitution; ill-conceived agricultural subsidies, good and bad market cycles. But "the one thing we never anticipated was alternatives to cork," says Senhor Zé—properly, José Manuel Marques, which almost no one calls him. "Screw cap. Plastic. On every kind of wine. They popped up and we weren't watching. Things in life have a tendency to come up when you're not watching."

Quercus suber is an endemic evergreen

Mediterranean oak with leathery, oblong leaves and thick, renewable outer bark—adaptations to the region's two common maladies, fire and drought. Before humans altered the landscape it was probably one of several dominant tree species in highly diverse Mediterranean forests, along with its cousin the holm oak, *Quercus rotundifolia*. (The holm, a fellow evergreen native, is not so profligate of bark but a doozy of an acorn producer.) Over the millennia deciduous oaks and other trees were felled; the "fruit" trees of the Mediterranean—cork, holm, olive, and umbrella pines—were left standing. The shrub layer below them was reduced, making way for crops where there was little water, and pasture for grazing where there had been none before. The result—part farm, part wildland—looks not unlike the savannas of East Africa, the wide oaks irregularly spaced in meadows of mixed grasses and shrubs. They occur today principally in Portugal and Spain and, to a lesser extent, in France, Italy, Morocco, Algeria, and Tunisia.

Farming cork has never been a job for the impatient. The earli-



Clockwise from top left: Senhor Zé stands proudly with a stacked *pilha*, dated July 10; a freshly peeled cork oak; a worker rips a piece of cork from a tree (the stiff plank will become flexible after it's boiled); another loads the planks onto a wagon; at a high-tech processing plant, corks await shipping in ventilated bins; a handmade eucalyptus-pole ladder and customized axe are essential *tirador* tools; a woman on the crew serves the traditional role of *aguadeira*, or water carrier. Middle: A close-up of a *pilha* shows the various qualities and thicknesses of the cork planks.



est age at which a tree can be stripped is 25; a second stripping comes 9 or 10 years later. Pale and highly corrugated, the cork from these first 35 years of bark production can be used in flooring or other lower-revenue products, but it's not until a tree is 43 to 50 that it will start yielding wine-quality cork. Thereafter it can be stripped every 9 to 12 years for the next century and a half.

Cork has been put to work since Tutankhamen was a tot, “. . . chiefly for ship's anchor drag ropes and fishermen's drag nets and for the bungs of casks,” noted Pliny the Elder in his *Naturalis Historia*, early in the first century A.D. By the Dark Ages winemakers seem to have forgotten what a good stopper cork made. Instead, they took to wrapping an olive oil-soaked rag around a wooden bung and used that to plug their vessels. Sometime in the mid-17th century, legend has it, a Benedictine champagne maker named Dom Pérignon got sick of hearing his bottles blow their oily gaskets. He tried cork, and—voilà!—the fine-wine industry was born. For the first time in wine's 5,000-year history, stored wine could be kept fresh.

Cork is, in many ways, the ideal stopper—lightweight, relatively impermeable, and elastic. “Cork insulates against temperature, vibration, and sound,” says Sofia Afonso, a researcher with APCOR, the Portuguese Association of Cork Producers. “You can compress it in one dimension; it doesn't bulge in another. And it's 100 percent natural, recyclable, and biodegradable.”

There is a blight in the cork-wine romance, however—a natu-

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rally occurring byproduct of microbial activity called 2,4,6-trichloroanisole, or TCA, which can turn up in food and in cork. Its presence is not a health problem; it's an aroma one. Wine is peculiarly sensitive to TCA, and even ultra-low levels can mute wine's flavor. Only slightly higher levels—still astoundingly low—can spoil wine, giving it the characteristically musty smell and taste known as cork taint. “Moldy old cardboard boxes stored in a damp basement” is how one wine writer likes to describe it. “Wet dog” is another's favorite.

In the late 1980s, when wine production soared, so did issues ascribed to TCA. A big reason, says a cork industry executive, was that cork producers, struggling to keep up with rocketing demand, focused more on quantity than quality. And as the wine industry became, in many ways, ever more modernized, cork producers were still treating cork as a forestry product, not as a food product. Luis Gil, a researcher at the Portuguese Institute for Technology and Engineering, explains that producers dried cork planks on bare dirt, used the same water to boil vat after vat of planks, and reused old wooden pallets as long as they held up, just as their great-grandfathers had done. Gesturing down at his pressed slacks and snowy shirt cuffs, Gil says, “I certainly never could have visited a cork factory dressed like this.”

But today at Amorim & Irmãos, and at Subercentro, cork factories in Alentejo not far from where Senhor Zé is harvesting cork, you could do a day's work in a white dinner jacket and black patent leather pumps and go straight on to dinner with the queen. These companies have invested millions of euros in state-of-the-art processing plants. “This place looks like a pharmaceutical company,” one of my companions says. “One that makes very big pills,” deadpans another. In fact, the factories are an admirably practical mixture of technologies ancient and new.

In the yards sit cork-plank *pilhas*, traditional piles in which large slabs of freshly harvested cork cures for six months before processing. The *pilhas* are marvels of engineering and beautiful to behold—hundreds of big, irregular, cinnamon-stick curls of cork ingeniously fitted together to form a precise rectangle. The *empilhadores* still orient the *pilhas* east-west for ventilation by the prevailing winds, and stack them belly-down to shed water. But these days they construct them on stainless steel pallets over asphalt or concrete pads laid at an incline to maximize drainage. The cork from the base of the tree, where moisture and microbe levels tend to be higher, is cut away to be made into agglomerate products such as tiles. Planks are boiled in high-tech Jacuzzis with carbon-activated filters. Samples are run through gas chromatography tests to detect any TCA before the cork even leaves the tree, and tested continuously as they go through processing.

The precautions seem to be paying off. “In the six years since this factory began operations, we have shipped 2 billion corks



drink for a cause

If you care about wildlife, here are four reasons to make sure you're buying wines sealed with real cork (clockwise from top left): the Bonelli's eagle, the Iberian lynx, the azure-winged magpie, and the Barbary deer. The long-term preservation of cork-oak forest habitat is key to these species' survival. Fewer than 1,000 pairs of Bonelli's eagles survive on the Iberian Peninsula. The bird, although protected, is threatened by habitat loss, illegal hunting, electrocution on powerlines, human disturbances, poorly sited wind farms, and competition with Griffon vultures and golden eagles. Of all the world's big cats, the Iberian lynx is among the closest to extinction, according to the World Wide Fund for Nature. Only about 100 survive. This feline favors a mosaic of dense scrub for shelter and open pasture for hunting rabbits. Scientists say the azure-winged magpie, though not currently threatened, could lose 95 percent of its range in Spain and Portugal if global warming causes desertification, as has been forecast. Once widespread in the forests of North Africa, fewer than 200 Barbary deer survive today in eastern Algeria and western Tunisia.—*Rene Ebersole*

CLOCKWISE FROM TOP: LEFT, JOSE B. RUIZ/NPL/MINDEN PICTURES (2); JIRI BOHDAL/NATURFOTO; MICHEL GUNTHER/WWF-CANON



to Australia, and we have not had one complaint of TCA,” says Henrique Martins Jr., Subercentro’s production director.

The United Kingdom’s Wine and Spirit Trade Association sampled 14,000 bottles of wine last year and recorded a TCA incidence of less than one percent. Says Gordon Burns of ETA Labs, a major testing lab for the wine industry in the United States, “With the application of research over the past seven years or so, the incidence of problems with TCA, at least among the major cork producers, has dropped dramatically, as shown by objective data from our lab.”

Vintners are seeing a difference, too. “The cork producers are making a good-faith effort to address quality concerns,” says Kay Simon, a winemaker who operates Chinook Winery, in Prosser, Washington. “Cork is a renewable resource, and we’re committed to it.” Last April Chinook invested in new bottling equipment, and stuck with cork.

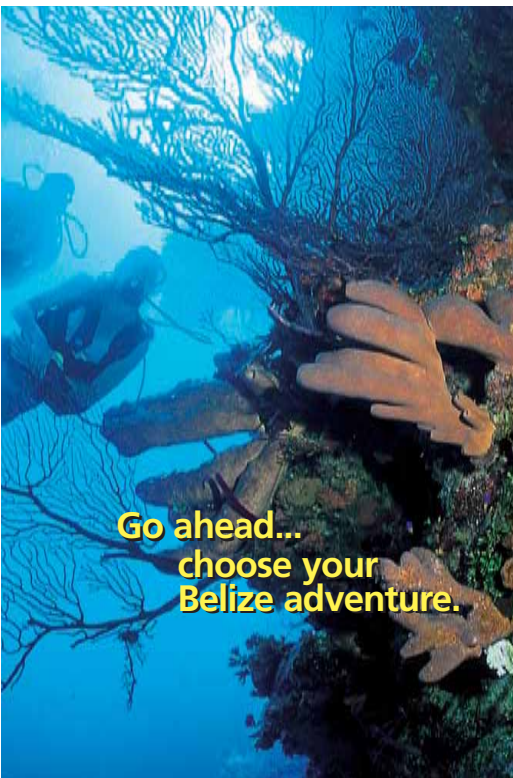
Despite cork producers’ quality-control improvements, however, cork’s market share is falling. While it is estimated that about 65 percent of U.S. winemakers use cork stoppers, only 50 percent of Australian wines are now sealed with natural cork, as are a mere 20 percent of New Zealand wines. Worldwide, says Martins, sales of natural cork are down. Portuguese cork exports to Australia and the United States, for example, dropped in value from 142 million euros in 2001 to 108 million euros in 2004—a 24 percent decline. Industry fears about TCA can

The Portuguese prune the crowns of cork oaks when the trees are young so they have few major limbs and airy, open crowns. This practice creates a lightly dappled shade that encourages the growth of shade-tolerant native pasture.

account for only part of this shortfall, experts say. Other factors are also at play. For one thing, most wineries have improved their crushing equipment, reducing astringency from seeds and stems, resulting in wines that can be drunk young, which means they don’t have the same need for a high-quality stopper. For another, some winemakers believe that the consistency of a synthetic stopper will make their wine

taste more consistent, bottle after bottle. Then consider the economics: Natural cork is simply more expensive. A solid natural cork costs 30 cents, on average; a plastic cork costs as little as 6 cents.

The United Kingdom is the world’s biggest importer of wine, selling most of it at large grocery-store chains such as Tesco and Safeway. To conservationists’ alarm, Tesco recently started requiring its wine suppliers to use synthetic stoppers, to lower their costs. Leitão, Tavares, and others working on the preservation of cork-oak woodlands fear that if a requirement like this becomes a trend, it could do the cork industry—and, by extension, cork-oak woodlands and the ecosystems they support—serious damage. “Tesco and some of the other big retailers are driving the change to artificial stoppers in the U.K.,” Tavares says. “They can pressure wine companies in France and other countries to switch to plastic. The RSPB wrote to Tesco several times. The company eventually



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responded by announcing its goal of converting all stoppers to artificial cork. "Now we must approach the problem from the demand side—the consumers—instead," Tavares says. "Wine drinkers who care about wildlife need to know that the cork they buy counts."

With funding from cork producers' associations, among other sources, the RSPB and the World Wide Fund for Nature (WWF) have conducted public awareness campaigns in Europe and the United Kingdom. Their goal is to educate both the wine industry and wine consumers about cork's role in preserving wildlife, and to encourage consumers to vote with their pocketbooks. In May 2006, for example, on the eve of the International Wine and Spirits Fair in London, the WWF published a hefty new report called "Cork Screwed?" that lays out the economic and environmental impacts of the switch away from cork stoppers. The report predicts that if trends continue, "three-quarters of the world's cork forests could be lost within 10 years." Piggybacking on publicity surrounding the fair, the report generated a slew of articles in both the mainstream press and wine specialty publications. The RSPB is also evaluating the feasibility of pressing the European Union to require that the type of stopper be listed on a wine bottle's label. Some companies, such as the British department store Marks and Spencer, already use a symbol for natural cork. "If consumers and the wine industry turn their back on cork, then these forests will lose their viability and risk facing the axe," says Grahame Madge, an RSPB spokesman. "If you're not drinking wine that's been in touch with a cork, then it is like felling the trees yourself."

These days there is much discussion in Europe and elsewhere of the relative merits of large-scale, industrial agriculture versus a smaller-scale, multiple-use model—what Tavares calls intensive versus extensive land use. The one generates more food for the world's growing population, of course, but at a greater cost in terms of chemical inputs, runoff, water and energy use, and loss of diversity. The other offers a more sustainable model that is easier on soil, water, and wildlife but produces smaller yields. Montado falls emphatically into the latter category, with its traditional Southern European mixture of livestock, a few crops, hunting leases for pigeon and partridge, organic honey production, wild mushrooms, and so on. But the bulk of these farms' income is generated by cork.

Barroca d'Alva, a 4,500-acre mixed-use

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estate near Lisbon, has added farm tours to its traditional uses, so Leitão and I sign up for a tour. A local high-school biology teacher named Fernando Pinto serves as our guide.

The first fenced section of montado Pinto drives us through is dotted with Portugal's famous Lusitano dressage horses. The next, beef cattle. A third harbors glossy black fighting bulls. Even lying down these princely warriors look nervy and athletic, tossing their shiny heads at the bee-eaters swirling overhead. The fourth montado has been relieved of livestock for a season or two. Here, as elsewhere, a white number is painted on each oak—the Barroca's show variously '4' or '0'—designating the year of last harvest. Several oaks are dead. These have a ring of white paint around their midribs, indicating that a forest warden has okayed their removal.

Standing dead oaks are not an uncommon sight in montados, thanks to an extraordinary law that was pushed through in the 1970s by Portuguese cork producers, after 500,000 acres of cork had been replaced with eucalyptus for the pulp industry. The law states that without permission from the government, it's illegal to cut down any cork oak in Portugal, dead or alive. A landowner caught clearing a montado pays a steep fine and is barred from using the land for 25 years. The law has helped preserve montados in lean times, but land managers call it too restrictive; they can't cull sick trees quickly to prevent infections from spreading. And although the Portuguese love their cork oaks, most people believe the law would not survive if cork revenues dried up. This countryside, pretty, sunny, and inexpensive, has been attracting wealthy urban Portuguese, which, in turn, has fueled a holiday-bungalow-building boom.

Pinto turns off the Jeep. We get out and walk in the aromatic shade of the trees, inspecting high holes for signs of tawny owls, low ones for genets—catlike omnivores related to civets—common predators in the montados. The grasses are tall here, but when you get in among them you can see that the underlying soil is loose and

dry. Drought has become a chronic problem in Southern Europe; land that was always warm and dry is threatening to turn into desert—another reason to protect the montado, Pinto tells us.

“A botany teacher from the University of Coimbra brings groups of teachers for training here,” he says. “The professor tells us, ‘The more we can preserve these forests, the more we will prevent the desertification of Portugal and the march of the Sahara onto the European continent.’”

Back in the Jeep we drive down a long dirt road to a high chain-link fence. On the far side of it sits the new training facility of Clube de Sporting Portugal, one of the country’s premier soccer teams. “This land was montado, but the government allowed the owner to sell. It’s only 64 acres,” says Leitão, “and cork is still profitable. But the balance can change very quickly. Imagine the situation when the montado is *not* profitable. I read in the paper the other day that the owner has a plan drawn up to build between 1,500 and 2,000 bungalows here. At the moment he’s not going forward with the petition for permits. But there is increasing development pressure on these lands.”

The irony is great, Leitão muses. The world is becoming more aware of the shortcomings of intensive agriculture. Sustainable products are gaining space in the pantry. People have a more sophisticated understanding of biological diversity’s importance. The wineries themselves are reducing their water and herbicide use. “And yet wine drinkers are switching to synthetic stoppers—petroleum products—with barely a fuss.”

There is still time, Leitão believes. If his group and others can get the word out, people will do the right thing. The montado will prevail. “Wine drinkers need to know about the role of the montados,” he says. “If they know that cork is sustainable, that it is a natural product, that it supports biodiversity, and so on, they will insist on natural cork.”

We turn away from the chain links and the blank gymnasium wall and gaze out over the intact montado, breathing in the lavender-scented air, taking in a last wood-lark wheeling across the sky in full, larkysong, before climbing back into the Jeep. Halfway into his seat Leitão is stopped by a thought. “You know, you can’t always tell what kind of stopper lies under the foil wrapper on a wine bottle. Sometimes you have to scratch the top of the bottle before you buy it to make sure it’s natural cork.” ■

Susan McGrath is a frequent contributor to Audubon, Smithsonian, and National Geographic.



SOUND STAGE

Bill was visiting Newfoundland and Labrador from South Carolina and definitely wanted to see the northern gannets at Cape St. Mary’s Ecological Reserve.

He’d seen the willow ptarmigan at Chance Cove, the northern fulmar at Tors Cove, and missed the red-throated loon. Maybe next time.

Off Route 100 and past the sheep, the road to The Cape was empty. He hadn’t seen a car for the last 20 minutes. But yet, the parking lot was full. Maybe he was late, he thought for a moment. Late for what?

Bill shouldered his bag and gave the Cape St. Mary’s Interpretation Centre a quick once-over. Bird Rock

was visible through the big picture window.

On the grassy coastal trail, Bill began to hear an odd sound. First it seemed like far-off gargling, and as he walked towards Bird Rock it got louder and louder. It was the birds, he realized, thousands of them calling, mother to chick, chick to parent. As he walked down the final incline to the lookout, he stepped over an invisible line onto a sound stage, took a small box from his bag, and pressed record.

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