







# THE OLDEN BOUGH

Humans have revered ancient trees for about as long as we've chopped down forests. What does that fraught relationship reveal about our past? Can it illuminate a path toward a more hopeful future?

By Trey Popp

**On** a bright November afternoon, Jared Farmer stood before a 55-foot-tall ginkgo in West Philadelphia's Woodlands Cemetery. The tree's fan-shaped leaves quivered at the tipping point of autumn—flame-yellow flashes streaking over seams of paling jade—while Farmer mused on its forebears. Two of the first three ginkgos planted in North America were cultivated on this very estate, by William Hamilton, who gave the third to his downriver friend John Bartram. The trio took root in 1785, two years before Philadelphia hosted the Constitutional Convention.



Jared Farmer sits next to the oldest ginkgo tree in North America, in Philadelphia's Bartram's Garden.

“The one in Bartram’s Garden is still alive,” said Farmer, who joined Penn’s faculty in 2020 and is the Walter H. Annenberg Professor of History.

In terms of longevity, that original is not much of an outlier. In the absence of external stress, ginkgo trees grow old without aging. That is to say, on a cellular level they do not senesce. This is one way trees in general differ from their human admirers. Wood production slows after a couple centuries, but ginkgos continue to churn out leaves, sperm, seeds, and antimicrobial defenses while converting sunlight into chemical ener-

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gy in what Farmer likens to a “default mode of immortality.” Some individual specimens have managed feats verging on resurrection. After the US detonated an atomic bomb over Hiroshima, a battered ginkgo less than a mile from Ground Zero generated new buds and a second growth ring for 1945. More than 75 years later, peace activists make pilgrimages every autumn to collect its seeds for distribution around the world.

The species’ endurance is even more impressive on a geological timescale. *Ginkgo biloba* is the lone survivor of a plant order that flourished across the planet during the Age of Reptiles. Withstanding multiple mass extinction events and outliving their original seed dispersers, ginkgophytes were gradually driven into the mountains of present-day China during the last ice age,

which wiped them out everywhere else. After the glaciers retreated, Chinese people started dispersing ginkgo seeds. Through all that time, and all those climates, the species appears to have remained essentially identical to fossilized antecedents that lived 100 million years ago. So when William Hamilton reintroduced it to North America, he became a link in a chain binding human caretakers with the fate of one of the oldest tree species on Earth.

The ginkgo’s remarkable planetary career is one of many that Farmer sketches in *Elderflora: A Modern History of Ancient Trees*. The 2022 volume is a compendium of wonderful facts. Some of the “early instances of forest capitalism and forest conservation” were catalyzed by medieval English military demand for yew trees, whose ideal suitability for longbows triggered a Continental chopping frenzy from which central European stands never fully recovered—despite the conifer’s uncanny ability to regenerate from fallen boughs or even stumps, and to change sexes (including on a limb-by-limb basis) at ages exceeding 1,000 years. In the 1820s, American entrepreneurs carved the massive base of Lake Erie’s “Big Black Walnut Tree” into a public house, then a grocery store, and finally a traveling attraction that offered Manhattanites, Philadelphians, and ultimately Londoners the chance to file in 30 at a time to gaze at walls covered with genteel art. Thirty years later, another spectacle-peddler converted a multimillennial sequoia into a piano parlor big enough to seat “all the wives of Brigham Young”—who had recently married his 48th—only to be outmaneuvered by P. T. Barnum, whose smaller but fake mega-cedar looked more plausible than the genuine California “Mammoth Tree.” More recently, radiocarbon dating has revealed that the Al-



Aqsa Mosque on Jerusalem’s Temple Mount was built in part with cedar beams reclaimed from Roman temples—which themselves had repurposed materials taken from monuments to Herod, the Jewish king who erected the Second Temple.

Meanwhile the planet’s biggest ginkgo grove is now half

a world away from China, on a South Carolina plantation where a German homeopathic company plucks the leaves of some 10 million brutally stunted, shrub-sized, but astonishingly resilient ginkgos with modified mechanical cotton harvesters to produce “mental sharpness pills” sold in over 60 countries.

Farmer’s long-gestating book hit bookshelves and libraries at an opportune time. From Peter Wohlleben’s forestry bestseller *The Hidden Lives of Trees* to Richard Powers’ Pulitzer Prize-winning novel *The Overstory*, trees have been having something of a moment. In India, millions of volunteers have planted hundreds of millions of saplings in massive single-day drives that have become a new annual rite. Last year the World Bank’s Forest Carbon Partnership Facility issued its first payment to an independently verified carbon-emissions-reduction project—a \$6.4 million beginning to a \$721 million commitment to “results-based payments for forest-related emission reductions.” Meanwhile scientific fascination grows for the mycorrhizal networks of the “Wood Wide Web,” through which tree communities swap and share nutrients and send chemical signals.

*Elderflora* serves up a reminder that this outpouring of arboreal reverence is just the latest chapter in a saga as old as mankind. The ascent of the human species “started with fire,” Farmer reflected as we strolled through the Woodlands. “It started with burning trees—clearing them for agriculture, or to produce a different type of habitat that was better for gathering



Chromolithograph depicting tourists walking in a grove of giant sequoias, each identified by name, circumference, and height.



food or hunting. And later, cutting trees for temples and houses and buildings. But there's this whole other part," he continued, "of people marking out trees and saying: *This is consecrated, and if you cut it, the gods will strike you down ...* Or if we do cut it down, we will save that tree for the most sacred sweat lodge, or canoe, or temple door or shrine or palace."

People depend on all kinds of plants, from cereals and legumes to tubers and cotton. But few of them stir our spirits. Nobody hugs soybean stalks or winter rye. There's just something about trees—especially old ones—that tugs at human heartstrings in a unique way.

"The relationship between humans and trees is a fraught one," Farmer said as we

strolled past flowering dogwoods and black walnuts and one of the biggest bald cypresses in Pennsylvania—a state named after its forests. "We revere them and we chop them down. We protect them and we vandalize them. But we tell stories about that desecration. And there's a reason we're still telling these stories."

**F**armer is a Utah native who trained as a historian of the 19th century with a regional expertise in the North American West. At Penn he created and teaches an undergraduate seminar called "Petrosylvania," which students have lauded for its nuanced examination, through archival resources and fieldwork, of the histories and legacies of coal, oil,

and natural gas in the "first fossil fuel state," with an emphasis on the city of Philadelphia and the University of Pennsylvania. He came around to thinking about trees almost by accident. Or—you could say with equal accuracy—thanks to a Steam Age robber baron who doubled as an arboreal exoticist.

When Farmer first stepped onto the college campus Leland Stanford brought into being in the late 1800s, he couldn't take his eyes off the foliage. Stanford University was a Spanish Revival wonderland where Canary Island palms and Tasmanian blue gums branched out amidst relic live oaks and coast redwoods within a curtain of eucalyptus that separated town from gown. There was a tree on the uni-

versity seal, a dancing tree mascot—it just went on and on, in this town that was itself named after a tree. “I had never seen a picture of Stanford,” Farmer recalled. “I didn’t know what to expect. And I was just dumbfounded.”

When he reached the history department where he would pursue his doctoral degree, the experience turned almost biblical. “I walk into this interior courtyard, and there’s an orange tree with a golden, ripe orange,” he said. “I can remember picking this orange—I couldn’t believe it was actually real—and eating this orange.”

California is, among other things, a constant provocation to ponder the border between reality and artifice. Daily walks through Stanford’s lushly wooded campus plunged Farmer into a curious space in between. The arboreal fecundity that generations of Californians have taken for granted is in large part a recent invention. Large swaths of the state were “basically treeless before European colonization.” Before Spanish Franciscan friars planted the first mission orchards in the late 1700s, orange trees had been as alien as orangutans. By the mid-20th century, the state’s vast citrus industry had created more wealth than its Gold Rush. As one brand of California capitalist reduced great tracts of redwood into shingles and railroad ties, another speculated on plantations of Australian eucalyptus as a fast-growing hardwood that could make up for the plunder—and perhaps even save the entire country from a lumber shortage, as some boosters pitched it. Meanwhile real estate developers plopped down palms beyond counting to lure homebuyers into an endlessly subdividable Golden State paradise.

On Stanford’s campus, which bloomed with these dynamics, Farmer had an epiphany: “You could tell the history of modern California—California since the Gold Rush and the conquest and the genocide—with trees.” His attempt yielded the award-winning *Trees in Paradise: The Botanical Conquest of California*, a

“florid love letter to the Golden State” that sought to show that “conquest can be beautiful” as well as disruptive.

“We have forgotten the importance of trees in US history,” the 2017 book argued. “It wasn’t just the promise of landownership for white male citizens that set the republic apart from European monarchies. East of the Mississippi River, the land was wooded in a way that Europe had not been for centuries. Americans responded to this abundance with profligacy,” turning trunks into timber with Bunyanesque vigor. Yet “the same spirit of improvement that had inspired the removal of forest cover in the East inspired the conservation—and addition—of trees in the Midwest and Far West.”

**N**orth America exemplified a common trajectory in the 19th and 20th centuries, during which the breakneck liquidation of old growth forests curdled into remorse over their vanished majesty, ultimately galvanizing heroic attempts to protect whatever remnants could be saved. It happened to New Zealand’s noble kauris, Chile’s towering alerces, colonial Taiwan’s multimillennial hinokis. (“To subjugate Taiwan,” a Japanese official declared, “we must conquer its forests.”) Yet as Farmer observes in *Elderflora*, Chiang Kai-shek’s Republic of China “caused far worse deforestation than the reviled Japanese occupiers ever did.”

Often, the journey from plunder to penitence occurred within the lifetime of a single generation. Men who built their mansions from millennial conifers “pioneered nature protection as industrial philanthropy” through vehicles like the Save-the-Redwoods League, which may have “resembled a pro-eugenics social club for nature-loving Republicans” but nevertheless made common cause with Sierra Club progressives to preserve old-growth groves.

Farmer has always been environmentally oriented. If he hadn’t pursued history, he reckons that he might have

become a landscape architect or a geologist. “Or even a geomorphologist: I just love understanding how the surface of the Earth has changed in the human past.” But writing an arboreal account of modern California changed the character of his environmentalism. “To my surprise,” he told me, “I became a tree hugger—in a way that I sometimes used to snicker at.”

*Elderflora* took him further down that path. Focusing on ancient specimens and long-lived species, which have inspired reverence across many cultures and eras, the book explores the shifting ways humans have turned to exemplary trees as objects of veneration and sources of insight.

Sweat lodges and temple doors are just the beginning. Even the history of modern tree-ring science, a central theme in *Elderflora*, reveals at least as much about human preoccupations as it does about the biology of bristlecone pines (from which the methodology has extracted especially rich knowledge). Men have sought all manner of things in the annual growth patterns of these gnarled Great Basin methuselahs—the reconstruction of biblical timelines, proof of sunspot radiation cycles, a record of our planet’s fluctuating magnetic field, the history of regional megadroughts and global climate change—and found many of them. Wild-eyed fanatics and cold-eyed scientists alike have often treated superannuated trees primarily as a means to an end. Yet the mystique of ancient trees is as old as the epic of Gilgamesh, and Farmer partly credits 19th- and 20th-century trophy hunters with reawakening a reverence that had been subsumed by industrial-scale exploitation in much of the world.

“Again and again, when I thought I was researching evolutionary relics and history of science, the sources led me to cultural relics and religious studies,” Farmer writes. “No longer am I surprised to encounter secular people in search of the aura of instrumentally dated trees. Their seeking fits a deep pattern.”





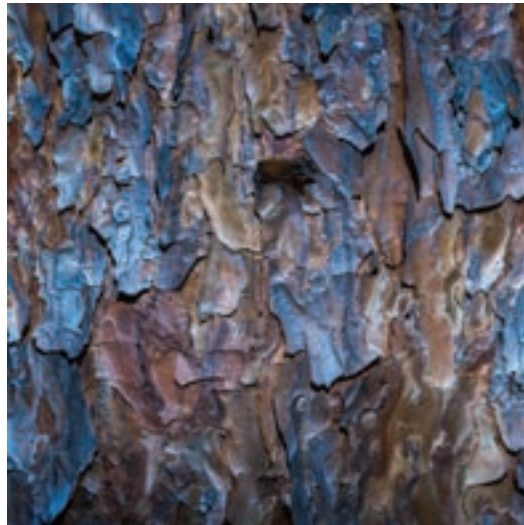
## Cambium Landscapes

**It's been nearly 25 years** since biology professor Philip A. Rea last appeared in the *Gazette*—for his research on using plants to neutralize toxic wastes in contaminated soils [*"Gazetteer,"* Sep/Oct 1999]. His interests have multiplied in the meantime. The Belledegrun Distinguished Director of the Vagelos Program in Life Sciences & Management has published on topics ranging from the history of statin drug development to a book of case studies of biomedical innovations.

On the side, he's been making fine art photography—including a series of close-up shots of tree bark.

"There are things we see almost each and every day which, if examined in isolation, as entities in their own right, from a particular angle or in a particular light, resonate with our senses," he explains. With these semi-abstract, highly textured renderings of striated, scarred, and flaking surfaces, Rea aims to convey a "heightened awareness of being alive but in an almost timeless, contextless way."

More of his photography can be found at [philiparea.com](http://philiparea.com).



It is scarcely a coincidence, for instance, that the Buddha is said to have achieved nirvana beneath a pipal tree. That *ficus* species, whose aerial root runners can split host trees apart to supplant them in tenacious feats of creative destruction, had been marked out as sacred by Vedic scriptures for centuries. The spread of Buddhism favored the fortunes of the pipal, which became a temple tree. Given that people neither eat its fruit nor use its poor-quality wood, Farmer observes, the species is distinguished by a uniquely human dynamic: it “was domesticated by—and for—devotion.”

Olive trees yield sustenance, including oil once valued as fuel for light. But there are deeper reasons that the Hebrew Bible depicted an olive branch in the beak of a dove as the first tangible sign of worldly rejuvenation sighted by Noah after the flood, or that olive imagery abounds in the New Testament. Olive trees, which grow in a compartmentalized fashion from independent and exceptionally hardy roots, are so adept at regeneration, Farmer notes, that “Greek law protected stumps, for they were considered living fruiterers.”

Christian pilgrims have been visiting olive gardens associated with Gethsemane, near Jerusalem, since the fourth century CE—and Farmer adopts a sympathetic view toward contemporary evangelicals who believe they are praying under the same trees that shaded Jesus. “Could that possibly be true?” he asks in *Elderflora*, before citing eyewitness testimony from the historian Josephus that “the Roman commander Titus destroyed all the gardens and fruit trees adjoining Jerusalem in AD 70, leaving a melancholy scene of desolation.” Yet it “seems doubtful that legionnaires axed every tree,” he adds. “Besides, olives can resurrect from the stump. Believers can therefore believe.”

And even for observers more impressed by radiocarbon dating suggesting an age of roughly 900 years, the remarkable fact remains: “At the Mount of Olives,

these trees outlasted the Crusaders, outlived churches made of stone. They survived to become the second holiest Christian site in Jerusalem. Although they lack eternal life, their dispensation exceeds that of all current governments.”

Perhaps the ease of chopping trees down amplifies the sentiment that accrues to specimens spared the axe. After deadlier weapons eclipsed the longbow, yews in all their long-lived and regenerative glory became “semisacred” icons of English churchyard cemeteries: consecrated trees imbued with “religious meanings at the local level” and symbolic resonance for groups ranging from traditionalist conservatives to New Age Wiccans. Across the modern world, the preservation of old trees and groves often takes on a nationalistic flavor just as readily as a religious one. Thus the cedars of Lebanon—which 16th-century European pilgrim-tourists “obsessively enumerated” as “incorruptible relics of biblical time”—have morphed into UNESCO-designated, government-protected icons that serve as “a unifying symbol in a nation divided by sectarianism and stymied by corruption.”

Yet trees felled in the name of progress—be it scientific or commercial—have also been leveraged to bolster ideologies of all sorts, from ethno-chauvinism to political correctness. Consider the fate of the “Mark Twain,” a 1,300-year-old sequoia cut down in 1891 to provide the American Museum of Natural History with the ultimate arboreal trophy: a cross-section of a tree whose base was more than 18 feet wide. Curators turned such artifacts into pedagogical tools that advanced particular historical narratives by way of timelines pegged to annual tree rings. In the early 20th century, these slabs frequently valorized a set of ideas verging on “white supremacy,” as Farmer puts it in *Elderflora*, by means of tags emphasizing things like William the Conqueror; the Christian Crusades; and the arrival of Vikings, Christopher Columbus, and the *Mayflower* in the

Western hemisphere. Yet a Mark Twain slab installed at Muir Woods National Monument shows how abruptly the historiographical winds can shift. “The original 1931 display included ‘Battle of Hastings,’ ‘Magna Carta,’ ‘Discovery of America,’ and ‘Tree Cut Down,’” Farmer reports. “In the multicultural 1980s, Aztecs and Anasazi supplanted English kings and barons, and ‘Tree Falls’ replaced the overly candid terminus. After further revision in the 2000s, Columbus completed his three-step downgrade from discovering the New World to landing in it to merely sailing toward it.”

Everywhere you go, people have singled some trees out as totems. Sometimes it happens literally, as with the cotton strings Indians wrap around chosen trunks or the rice-straw ropes used for the same purpose in South Korea. Sometimes it manifests in the form of protected preserves like Muir Woods or Sequoia National Park, each of which draws about a million visitors in a typical year.

“People have feelings about trees. People really care,” Farmer exclaimed as we ambled along. *Elderflora* posits that the rise of tree ring science changed and deepened the character of that veneration. Beyond proving what had previously been conjecture—that some trees could indeed live thousands of years—dendrochronology demonstrated the astonishing resilience of particular species to drought, fire, pests, and other threats. Furthermore, annual variations in ring sizes in species like bristlecone pine enabled scientists to reconstruct the climatic conditions ancient trees had weathered.

One upshot was a pattern that’s been repeated around the world: scientists bestow significance upon some specimens or stand, tourists flock to bear witness, and then a government endeavors to protect it. “There are now thousands of de facto sacred trees that didn’t exist before” this secular process played out, Farmer exclaimed. “They are de facto



People posing with an 18-foot-diameter slab of the “Mark Twain” giant sequoia, felled in 1891 to be exhibited in the Natural History Museum in New York.

pilgrimage sites that people treat with reverence, and sometimes devotion, and have these very emotional experiences visiting these ancient trees. When you look at a place like Sequoia National Park, isn't that a sacred grove?"

Though sheer size is a good predictor of which trees humans choose to honor, veneration often flows to species that combine seeming immortality with extreme vulnerability. Before men came after them with serrated saw blades, the oldest sequoias had survived so many threats that they came to be regarded as essentially indestructible. Bristlecone

## Hallowed trees now bear a 21st-century dread. “They’re beautiful anachronisms. Their climate left them 100 years ago.”

pinus embodied what pioneering dendrochronologist Edmund Schulman dubbed “longevity under adversity”—the oldest specimens often being found in poor soil and exposed locations, where limited competition favored a gymnosperm capable of shutting down damaged sections to bolster viable ones, even as its living outer layer of cambium remained just as vigorous at 4,000 years as at 40.

But tree love has lately become entangled with a sense of impending doom. In California alone, an estimated 129 million trees were killed between 2010 and 2017 by bark beetles, whose populations have exploded amid warming temperatures and drought conditions. Since 2014, this climate-pest interaction has brought death to at least 28 giant sequoias once regarded as all but imperishable.

Considering ancient trees from the vantage point of 2022 puts Farmer in a poi-



gnant mood. “They’re beautiful anachronisms,” he told me as we walked. “Their climate left them a hundred years ago.” That atmospheric shift is etched into the rings of the very bristlecone pines it threatens. The fact that many continue to hang on shows “magnificent resilience,” he added. “But trees have these hard mechanical thresholds for things like hydraulics. At a certain temperature, at a certain level of aridity, trees just have a hydraulic crisis and stop functioning. And that’s going to happen more and more.”

But apart from being what the *Wall Street Journal* called a “fascinating far-ago of a book,” *Elderflora* is also Farmer’s attempt to “say something hopeful, or at least anti-hopeless”—as he puts it in the introduction—about the future.

“Climate doomism is ‘our team’s’ equivalent of denialism,” he remarked in the cemetery. “It’s an abdication of hope. And if you give up hope, you give up the ethical imperative to act.

“So one of the challenges of climate action is finding time for hope,” he went



on. Tree appreciation offers a way that's already embedded in many cultures. "Our relationship to them is very old, and there's no reason to think that can't continue—even in a more precarious future when habitats are changing," he mused. "If you can imagine humans in the future still caring about a ginkgo 1,000 years from now, that's a continuity that connects to us now, that connects to ancient China—but then, through the ginkgo species itself, it connects you to a time before previous extinction events."

Among episodes in recent human history, the story of Australia's Wollemi pine suggests that this brand of tree-hugging has the potential to mobilize collective action. Before canyoneers spotted a few hardy specimens in the Blue Mountains in 1994, *Wollemia* had been thought to have gone extinct eons ago. The discovery of this "living fossil" touched off national excitement—and, almost simultaneously, national anxiety, when a wildfire prompted Aussies to agonize "over the possible extinction of a species they didn't know existed weeks before." The wild trees held on, and the largest one, dubbed "King Billy," was soon being cloned and marketed by a commercial nursery as a national icon "on par with koalas, wallabies, and kangaroos," Farmer writes. During the devastating Black Summer of 2019–20, when flames reached the very rim of the gorge that sheltered the original Wollemi pines, the government mounted what it called a "military-style operation" to save the stand, dropping water and fire retardant from bombers while firefighters irrigated below.

Yet a danger still lurks wherever old trees rouse human emotions. Used as rhetorical props, they can camouflage venality as easily as they can stir virtue. Standing among giant sequoias soon after his 2001 inauguration, President George W. Bush delivered an object lesson on how both can happen at once. "Some fear that places like this are scenes from a passing world. They're not. They

will be here as long as we're willing to show careful regard for the environment ... It will be to our lasting credit if these works of God are still standing a thousand years from now," intoned the president who was simultaneously withdrawing from the Kyoto Protocol. Twenty years later, a similar script played out in Australia, where the ruling Liberal Party announced World Heritage Site protections for the Wollemi pine as an "asset of intergenerational significance." Meanwhile, Farmer notes, "the same politicians continued to give devotion and protection to Australia's coal industry, a stance climate activists called intergenerational thievery."

Nevertheless, ancient trees still have an undoubted power to stir people to stewardship, and that counts for something. Contemporary discourse around climate change is often tied to geological epochs. Rising during the Industrial Age from a baseline that had been steady for some 800,000 years, we are told, atmospheric carbon levels have now reached a level last registered on Earth roughly four million years ago. But *Homo sapiens*, who only came along much later, struggle to think on such distended timescales.

"Geological time is so intellectual. It's so remote," Farmer said as we approached the end of our walk. "It's very hard for people to feel geological time. But I think you can feel tree time. And there are trees all around the world that live a very long time. Not always 1,000 years, but they get to that seventh-generation—or beyond your grandchildren's grandchildren—threshold, beyond which it's normally hard to feel in the deep future."

And that, he said, may be one of the central challenges humans face in the 21st century.

"People are actually pretty good about retrospective thinking—long-term thinking in the past," the historian observed, casting a glance over the tree-topped tombs around us. "I mean, the cemetery

is one of the oldest forms of landscapes. Burial grounds are really as old as our species. One of the great commonalities of all human groups is that we care about our dead. And not just at the moment of death, but we care about the place where the remains are placed. And we return to that place, and care about that place, and the connection between the dead, the living, and that place.

"But how many people care that much about 1,000 years from now? Or even know how to do that?" he asked.

In a present age dominated by economic thinking, arguments for conservation are frequently cast in terms of "ecosystem services." Through that prism, trees matter only insofar as they produce measurable benefits, be it a sustainable source of wood pulp for magazine paper, air-pollutant filtration, greenhouse-gas sequestration, or cooling shade for city streets. Farmer allows that all those things are relevant. But in *Elderflora* he draws upon a wider variety of human experience to suggest that trees can give us something whose value transcends quantification.

"One of the greatest gifts of trees is the gift of contemplation—the invitation to think about a long time. It's an ethical gift of temporal thinking," he said.

"You can't quantify that the same way as canopy cover or temperature difference between shaded versus unshaded neighborhoods—which is important too. But we collectively need to come up with ways to think about the future as a real place that we care about—that has people but also other living things that people care about," he declared. "And I think trees are a good way to do that.

"They're not the only way. But it's a very powerful way. A lot of people care about trees. In a sense, that gives even more urgency: if we want as many people as possible to experience the beauty of a tree, and care for it in a well-built city on a habitable Earth, all the more reason to act now."