

Can David Milarch Save Endangered Trees Through Cloning?



People said David Milarch was nuts. Then his far-fetched plan for saving our treasured trees started to work.

By Melissa Fay Greene
April 2014

The story of the world's most optimistic and improbable reforestry project began 45 years ago with a young man's shock and grief.

In 1968, a brawling, shaggy, redheaded, hard-partying 18-year-old named David Milarch (pronounced *Mill-ark*) graduated from a Detroit-area high school and took off on a road trip with a friend. They cruised along in a '61 Oldsmobile station wagon, sleeping in the car at night or on the ground nearby. Destination: San Francisco. But Milarch, unlike his buddy, harbored a deeper longing than crashing parties. "Cities didn't interest me so much," he says. "I wanted to see the redwood forests."

The son and grandson of nurserymen, Milarch grew up working on his father's shade tree farm, where ash, maple, oak, birch, and locust trees were cultivated. From age seven, he was in the fields every day after school and every weekend— weeding, hoeing, digging, and planting. He considered his dad a slave driver but nevertheless says, "I communed with the beauty and the laws of nature. I got a deep understanding of how things worked." At 18, when it was his turn behind the wheel, Milarch steered not toward the street life of Haight-Ashbury but to Muir Woods National Monument.

There the young men parked and approached the old-growth forest of coast redwoods, also known as California redwoods. The tallest trees on earth (over 300 feet tall), they are also among the oldest, some an estimated age of 2,000 years.

Milarch crunched into the soaring, misty, tangled woodland and felt moved by its haunting majesty, its profound peace and archaic dignity, its crystal streams and twittering bugs and birds. Here, he felt, was holy ground.

But the teenager's wonder was short-lived. This pristine, cloud-scraping sanctuary was being decimated by logging companies. It was as if he'd knelt in awe in the Notre Dame Cathedral of Paris and looked up to see wrecking balls shattering the stained glass windows. Beyond Muir Woods's protected 554 acres (of which only 240 still held the foggy, ancient redwoods) stretched a lifeless wasteland. "We drove through hundreds of miles of stumps," he says. "I felt physically sick."

The coast redwood (*sequoia sempervirens*) is one of three living descendants of a 240-million-year-old tree family from the Triassic era, when earth's continents were part of a single landmass. (The other two are the giant sequoia of the Sierra

Nevada and the dawn redwood of China.) Before the mid-19th century, the coast redwoods towered above two million acres of America's Pacific coastline. They created their own ecosystem, laundering the skies, purifying the water, enriching the soil, sustaining unique flora and fauna, and anchoring the land. The forest was a natural carbon sink, breathing in CO₂ and exhaling oxygen.

In the 1830s, American loggers discovered that redwood lumber was beautiful, straight, lightweight, and strong, and by the 1850s, lumber companies were hacking down these trees around the clock. The 1878 Timber and Stone Act allowed public lands "unfit for farming" to be sold at \$2.50 an acre to private interests. Thus, the redwood giants, virtually impervious to fire, water, rot, insects, and—it seemed—time itself, fell into the hands of lumber barons, where they proved vulnerable to the saw, the chain, and the mule team. One after another, the patriarchs of the forest collapsed in thunderous defeat; workers cheered, danced jigs on the stumps, and posed for photographs like big-game hunters grinning triumphantly beside dead elephants.

The primeval coast redwood forest was so deep that the first century of commercial exploitation trashed only a third of it. After World War II, power tools and the housing boom annihilated most of the rest. By the time 18-year-old David Milarch tiptoed into Muir Woods, 95 percent of the coast redwoods, an area the size of three Rhode Islands, were gone forever. The boy stood in a fragment of a vanished world. And even that fragment was still being logged. It's still being logged today.

Milarch returned to his father's shade tree farm, but the work no longer fed his soul. "We worked with clones of about 60 non-native species and sold the clones over and over," he says. "Human beings were destroying the ecosystem, yet all we

were putting back was clones of species from hither and yon, trees chosen not for their size, vigor, longevity, or indispensability to life. They were chosen for their pretty leaves and flowers.”

In 1977, Milarch married Kerry Cook, a teacher, and they had two sons, Jared and Jake. They moved to the Milarch family farmhouse in Copemish, Michigan, a town of 200, where they live today. In the Ojibwa language, *Copemish* means the “place with the big beech tree.” Of course, that beech—like most of America’s giant trees—was gone.

Milarch, who took over the business from his dad, was drinking heavily in those years. One day in 1991, he tripped and fell down drunk at one of Jake’s T-ball games. Looking up from the dust, he blearily perceived that he’d become a laughingstock, an embarrassment, an alcoholic. He locked himself in the bedroom that night, telling Kerry he wouldn’t emerge until sober. Quitting cold turkey is not the safest way to stop alcohol addiction. Within a few days, he was so sick from renal failure that his wife and a friend rushed him to a hospital.

At his bedside, his family thought he’d died. What he remembers is that his consciousness left his body; he seemed to levitate through realms of ever-increasing light. He recalls beholding a world of pure goodness and unconditional love before plummeting back into his body, after which he sat up, shocking everyone.

It was a classic near-death experience. Milarch woke up a changed man. He’d been privileged with a revelation: Earth’s forests were disappearing, he said. Not just the redwoods he’d mourned for decades but all the forests. “Picture earth in space,” Milarch told his wife, his friends, and his sons. “Can you see the mantle—the green verdant layer encircling the planet? It was the lungs and natural filter

system for all living things. It existed for millions of years. We've shaved it almost completely away.”

But Milarch saw a solution: The greatest surviving ancient trees—the so-called champion trees, identified by foresters, state governments, and federal agencies as the biggest or oldest of each species—could be cloned. Their DNA could be preserved, and their clones could be planted around the world in appropriate regions.



As a shade tree farmer, Milarch nurtured trees all the time. He would turn his skill now to the last of the forest giants. He saw clearly that reforestation needed to start immediately, but not with ornamental species. “The Era of Preservation is over,” he told people.

“There aren’t enough old-growth habitats left to preserve. We’re entering the Millennium of Restoration. We’ve got to rebuild with the best we’ve got, the largest and oldest living things on earth.”

He grew obsessed with his vision to the point of bankrupting his shade tree business. He talked himself hoarse and was branded a crackpot. The family lived on Kerry’s modest teacher’s salary. Neighbors occasionally gave her used coats and boots for the children. But she believed in the vision. So did their sons.

In 1996, with no money, Milarch and his family launched the non-profit Champion Tree Project.

Almost no one outside their family cared.

Most people didn't care because they hadn't heard about—or didn't believe in—a vanishing-forest crisis.

In America, there is a powerful optical illusion at work. Sure, we think, giant pandas, Siberian tigers, and polar bears might be disappearing, but you can look outside and see trees. Our species evolved in trees. We still like to live under and near trees, so we keep them handy. But landscaped city parks, tree-lined highways, and backyard plantings do not replace the world's old-growth forests.

The occasional stand of trees in America's suburban neighborhoods are leftovers. They descend from the trees not felled by pioneers, settlers, farmers, or lumber companies. "It's called high-grading a forest when loggers take the best trees," says Terry Mock, environmental consultant to Champion Tree. "They leave behind the poorest-quality. High-grading leaves the forests with lousy genetics and ruins the quality of future trees."



"We think a 90-foot tree is huge," Milarch says. "But the trees in America's great virgin forests averaged 90 to 130 feet. Most trees now are crooked, puny, and short-lived. They're junk."

Even if a lone grandparent tree rises above a patch of woods, it won't thrive.

Trees need forests; they need acreage and undergrowth. A solo tree or a few trees clinging to a forest's edge have dim prospects of propagation; and, these days, most trees cling to an edge. The bits and pieces of woodland scattered across the Eastern United States, surrounded on all sides by urban development, are too small to function like vibrant ecosystems, to nurture a diversity of species.

Ecologists call these habitat fragments islands and know them to be where plants and animals decline to extinction.

Legend holds that prior to the European conquest, a squirrel in North America could hop on a tree at the Atlantic Coast and leap from tree to tree to the Mississippi River without ever touching ground. These days, that squirrel would be lucky to make it out of a New Jersey parking lot alive.

Memory also blinds us to the reality of endangered forests. Many folks treasure a forest from childhood or from an ancestral homeland. Because those beautiful places still sparkle and sway in our books, songs, and poetry, we may not realize their earthly counterparts are gasping for life. In Kentucky, the Daniel Boone National Forest is being converted by the U.S. Forestry Service into a regulated tree farm, and the Appalachians are under siege. More than half of the world's boreal forests have been reduced to junk mail and catalogs. The rain forests of South and Central America, Africa, and Indonesia, including the magical cloud forests; the enchanted Danube basin; the Black Forest; the monumental Russian Taiga—all are falling, falling. Whatever you've loved, whatever you think you remember: It's nearly gone. Do you think of Ireland as deeply wooded? It's the most deforested country in Europe.

But in the '90s, even the few people who acknowledged the crisis were highly skeptical of the idea that a nurseryman could clone an ancient tree. Young trees reproduce easily, even in the "assisted reproduction" of cloning. But Milarch was talking about 100-year-old trees, 1,000-year-old trees, 5,000-year-old trees. Where great trees no longer stood, he wanted to clone gigantic stumps. For experienced foresters and nurserymen, this sounded like soliciting human sperm samples and eggs from nursing homes, hospices, and cemeteries.

Impossible!

But Milarch happened to have a favorite saying: “Impossible just takes longer.”

The Champion Tree Project inched forward. With permission from private landowners in Michigan, members took grafts from the National Champion ash, elm, and maple. Then Jake Milarch and colleague Tom Broadhagen retreated to the far side of the greenhouse and pushed the frontiers of tree-cloning science. As clones sprouted and took root and saplings were shared around Michigan, the Milarchs looked outside the state and back in time.

At Mount Vernon, they were given access to trees hand-planted by George Washington. Our first president’s ash, hemlock, tulip poplar, mulberry, and American holly proved remarkably easy to clone. Hundreds of saplings from 12 trees were donated by Champion Tree to Mount Vernon, and one was planted on the grounds of the U.S. Congress.

In 2001, the Champion Tree Project made the cover of *American Nurseryman* magazine and, later that year, the front page of the *New York Times* Science section in a story by Jim Robbins (who would later write *The Man Who Planted Trees*, a book about Milarch). Those stories led to new allies, including forestry experts, professors, and donors. In 2008, Milarch renamed the project the Archangel Ancient Tree Archive (ancienttreearchive.org). The work has now reached into 20 states, plus England, Ireland, New Zealand, Australia, and Germany.

One source of pride includes the Hippocrates sycamore: In 1969, Greece gave the United States a sapling cut from the tree under which, according to legend, the father of Western medicine taught the world’s first med students roughly 2,400

years ago. When that gift died, Archangel took still-living grafts from the trunk and cloned them. “We have 50 Hippocrates sycamores—100 percent clones—growing in our greenhouse right now,” Milarch says. “On Arbor Day, there’s going to be a ceremony in front of the National Institutes of Health in Bethesda when we plant one.”

And what of his beloved redwoods? Red tape by state and federal authorities has blocked access for cloning on public land, so Milarch and his sons made frequent trips to California in search of privately owned giants.

“I was in the coast redwoods in 2010,” Milarch says, “and Jake was 700 miles south, in a remote area of the Sierra Nevada, hunting for giant sequoias. He and a brilliant self-taught tree guy named Michael Taylor were stopping in small towns, visiting bars and cafés where loggers hung out, and asking people, ‘Where are the biggest trees?’ and someone had heard a legend about a hidden grove. Jake and Michael followed directions, and they followed intuition and found it. The holy grail. Lost to the world. It was an intact giant sequoia forest of 800 acres, at 6,000-foot altitude.

“Jake sent me a message: ‘Dad. We found them. Get here quick.’ There was a photo of him standing next to a tree so massive, I can’t even find the words.

“I was frantic to get to him. I had someone drive me to the Crescent City airport, but it was fogged in. ‘I’ve got to get inland!’ I said, and we started racing around looking for open airports. Yes, these trees had stood for 3,000 years; yes, they would probably still be standing the next morning. But if you’ve waited your whole life for something, not even knowing if it actually existed ... Well, you got to go.

“I got down there about midnight, and Jake and Michael picked me up. They said, ‘You will not believe your eyes.’ The next morning, we drove to the top of a mountain, privately owned land, guarded by a 91-year-old man who wouldn’t let anyone near his trees. Evidently, he’d been a logger his whole life, and his father before him, and working on teams of hundreds of men, they’d helped cut down millions of acres, and then at some point, I guess he had an epiphany: ‘That’s it. I’m not killing any more giant sequoias.’”

This hidden grove, the Alder Creek Grove, was private land surrounded by Giant Sequoia National Monument. One of the trees in this grove turned out to be the Stagg Tree, the fifth largest in the world by volume. Another was the Waterfall Tree, which has the largest diameter at ground level of any giant sequoia in the world—57 feet across. The owner permitted Jake and Tom to climb the trees and take cuttings.

Milarch remembers thinking, OK, now we’ve got them, but can you clone a 3,000-year-old redwood? Talk about impossible—the oldest giant sequoia ever cloned was 80 years old.

At the far end of the greenhouse in Copemish, Jake and Tom got to work. A month passed without success; five months passed. Jake and Tom grieved each failure, as if they could feel the primeval DNA washing through their fingers. And then a tiny slippery white thread, the size of a pinworm, peeked out of a scraped section of the 3,000-year-old Waterfall Tree.

As this issue was going to press, Milarch’s crew was preparing to embark on a 700-mile redwood expedition, starting in the Sierra Nevada and trekking down the Redwood Coast, photographing the forests and planting 3,000 cloned saplings carrying the mysteries of the millennia in their DNA.

“Our trees will be gifts to the world,” Milarch says. “Gifts to our grandchildren and great-grandchildren.”

But on that day four years ago when Jake Milarch walked toward his father, holding in his shaking hands the slippery sprout of the first baby giant sequoia, he said, “This one’s for you, Dad.”

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