'EVERWHITES'

MARIA J. ÁVILA LÓPEZ/MERCURY NEWS

Docent Dave Kuty said he fears rare albino redwoods could be destroyed.

# Scientists try to unravel mystery of 'forest ghosts'

Trees

Disappearing, reappearing albino redwoods spark university study

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FELTON — Strong, tall and older than America, coast redwoods are the royalty of Henry Cowell State Park.

But down on the dark forest floor are a few pale and fragile offspring: albino saplings, which seasonally appear and disappear like specters, leaving only mystery.

Rare genetic mutants, these ill-fated "ghosts of the forest" are spurring scientific study at Stanford University and UC Santa Cruz.

Gloved researchers cut little samples of tissue, pack them in ice and drive them back to labs. At Stanford, they seek to

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## Trees

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decode the genome. At UC Santa Cruz, they are studying the trees' structure and function, hoping to learn how so helpless a tree survives.

"It is a great puzzle," said Ghia Euskirchen, director of the DNA Sequencing Program at Stanford University School of Medicine.

They are the only white evergreens in the world; about 60 of these ethereal trees have been reported. Seven are known to exist at Cowell Park, eight near Aptos, two in Big Sur State Park and six at Humboldt Redwoods State Park. Small and reclusive, they are hard to spot.

Their existence has been rumored since the 1890s, when a San Francisco Call newspaper reporter described "everwhites" in a wagonload of Christmas trees delivered to city streets from the rural Sonoma County town of Cazadero. In the early 1900s, pioneering plant physiologist George James Peirce of Stanford peered at one through a microscope. Big Sur poet Robinson Jeffers described one in a letter to a friend.

But they're poorly understood, and their locations are a fiercely guarded secret, except for a lone specimen on a Cowell Park trail and another near the pay booth at Big Sur's Fernwood Campground.

"There are so few of them," said Cowell docent Dave Kuty. "It is a population that we could destroy, if they are plucked every year. Then we'll never understand them."

Albinism is common in animals, especially rats and rabbits. But it's very unusual in plants, because nothing is as central to a plant's existence as being green. That's because the plant pigment called chlorophyll is vital for photosynthesis, which allows plants to obtain energy from light. Without it, the trees have no way to manufacture the food needed for growth.

There are other oddities. Their needles feel like wax. The wood isn't strong and lacks critical chemicals. Their internal vessels are narrow. And their growth rings are very close together, suggesting slow growth.

So they can't live independently — and forever remain sprouted on a parental trunk.

When times get tough, the parent tree withdraws all support and the seedlings perish, turning brown.

In times of abundant rain, they sprout again, flourishing.

"They come and go, like ghosts," said Kuty. "They starve to death and shrink back. Then they reappear."

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>
> *— Dave Kuty, Henry Cowell State Park docent*

Such delicacy would seem to hold little value for a species of such hardy old souls. Nearby siblings, on the same trunk, are bright green, vigorous and resilient.

"What the heck is going on?" asked Cabrillo College historian Sandy Lydon, coauthor of the book "Coastal Redwoods," who saw his first white redwood as a youngster while fishing in Pescadero's Butano Creek — and has been enraptured ever since.

"Almost everything that a redwood tree does is survival response. The way they race for the sun. The way they regenerate. The way they respond if hit by lightning," he said. "Now here is something that has not a damn thing to do with any of that.

"I'm hoping that science can give us a clue."

At Stanford, a team is on a hunt for the genetic change, or mutation, that renders trees so weak and white — as well as any other differences that create species variation.

Understanding the genetics of the coast redwood is a daunting task. Genetically, the tree is what's called a hexaploid. That means that each of its cells contains six sets of chromosomes, for 66 chromosomes total. In contrast, humans are merely diploid, with 23 chromosomes. Such abundance is very unusual — and could suggest more opportunities for mutations.

"It is much more complicated than humans," holding much more genetic information, said Stanford's Euskirchen, who plans to study the molecular blueprint of both normal and albino redwoods, then compare their results.

UC Santa Cruz scientist Jarmila Pittermann, in contrast, is studying the tree's physiology. In normal plants, leaf pores open and close in a delicate dance, to lose water and absorb carbon dioxide for photosynthesis. She wonders: When there's no need for carbon dioxide, what do the white trees do to regulate water transport?

"It gets even weirder," she added. "These albinos don't do anything — they're like parasites. How do they take up nutrients that they can't make for themselves?"

Scientists agree that the mutation suggests something that is critical to evolutionary success: diversity. The greater the diversity, the better a species can take on the challenges of life, particularly in tough places.

Along the way, perhaps other mysteries will be solved, such as: Why are some trees resistant to pathogens? Why do others build strong buttresses under each branch? How can they tower so tall? And what has given redwoods the ability to endure so many centuries of fires, wind and storms?

"They are so inspirational, so much a part of who we are and what we value," said Lydon. "The more we know, the better."

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