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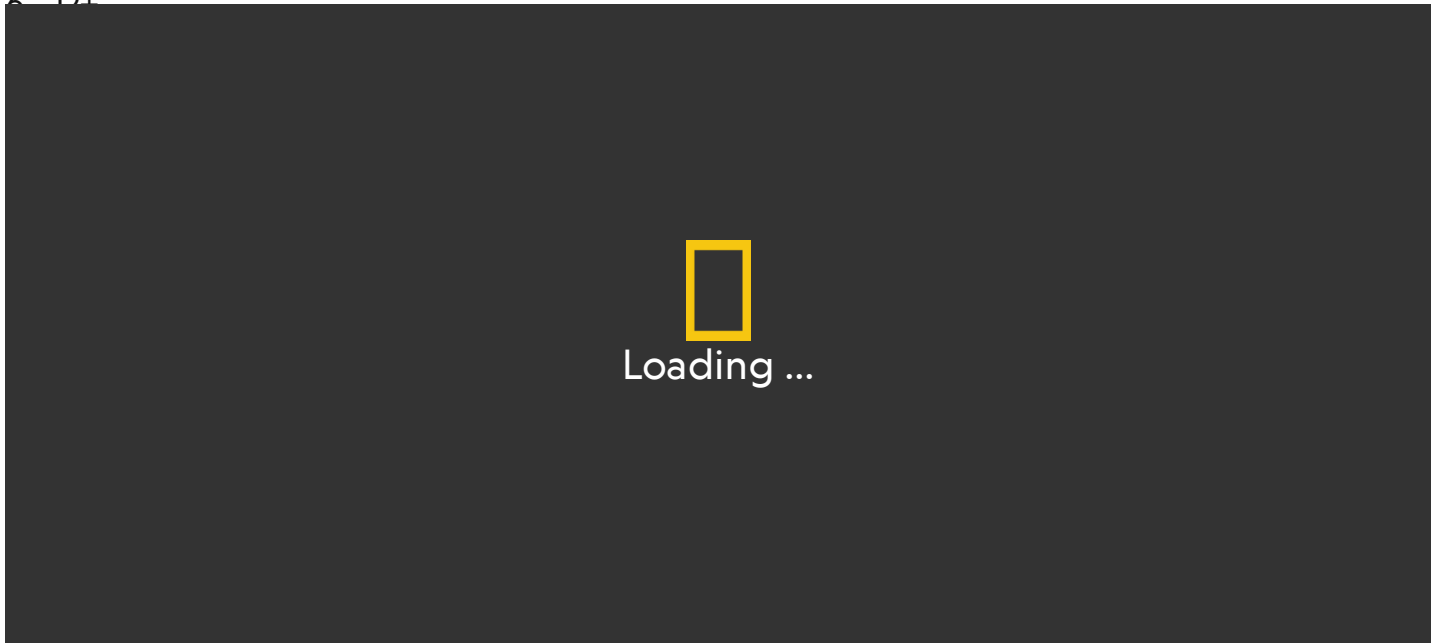
ARTICLE

White Wonders

With snow-white needles, albino redwoods are a rare and fascinating sight within California's redwood forests. Physiology professor Jarmila Pittermann and state park docent Dave Kutty locate some specimens and explain what they know about the unique plants.

GRADES

6 - 12





BACKGROUND INFO

VOCABULARY

A walk through Felton, California's Henry Cowell Redwoods State Park reveals many wonders. On the Redwood Loop Trail, moss clings to the trunks of Douglas fir trees like green leggings, while a mushroom fills a crack in a tree like caulking.

But it's a bushy, mostly brown tree with snow-white needles that draws the attention and fascination of scientists.

The shrub-like vegetation is actually an albino coast redwood tree. At some times of the year, albino redwoods have distinct white needles. During the winter, they have a good amount of brown foliage.

While looking at an albino redwood, University of California at Santa Cruz plant physiology professor Jarmila Pittermann points out a thin, healthy-looking coast redwood nearby. Pittermann is researching the structure and function of albino redwoods.

“The albino plant behaves a lot like a parasite, because it’s dependent on the parent plant for everything,” she says.

The healthy parent tree towers high above the albino redwood, which is just about a meter (3 feet) tall. The albino tree is attached to the parent tree at the roots. It gains all its nutrients from the parent tree, even though the parent tree uses most nutrients itself.

“They [albino redwoods] definitely have much slower growth rates,” Pittermann says. “It appears they just eke out a living.”

It’s not just the color of the albino redwood’s needles that are different from their green counterparts. “I would say the leaves are softer, thinner, less waxy, a little more bendable,” Pittermann says.

Albino redwoods lack chlorophyll, the green pigment in plants. Without chlorophyll, albino redwoods are unable to engage in photosynthesis. Photosynthesis is the conversion of light into chemical energy that is the basis of a plant’s life. Most plants are producers, meaning they produce their own food. Albino redwoods, which cannot produce nutrients, are parasites, depending on the parent tree for life.

Pittermann finds it amazing that the albino trees have adapted to survive without chlorophyll and photosynthesis.

“We are trying to understand ‘What does this mean for the function of the plant?’” she says.

Counting the Albinos

Joining us on our walk is Henry Cowell Redwoods State Park docent Dave Kutty, who is attempting to locate all of the albino redwoods in the nearly 7,689-hectare (19,000-acre) park. As we wander towards the next albino

redwood, Kutty says that he has discovered eight specimens within the park during the last five years.

Approximately 60 albino redwoods exist in California, from Humboldt in the north to Big Sur in the south. However, new specimens are still being discovered.

“We just don’t know the extent of albinism in California redwoods,” Kutty says.

“I would say dozens [of albino redwoods exist] conservatively,” Pittermann says.

The next albino redwood we arrive at is much taller, almost four meters (12 feet) high. It also has more white leaves, which makes it look a bit like an artificial white Christmas tree.

“It’s the biggest pure albino here,” Kutty announces.

Staring at the unique tree, Pittermann recalls the first time she came across an albino redwood. “I was really amazed,” she says. “I didn’t know they would

be as vigorous as they were. To see something like this was a bit of a revelation.”

Kuty also remembers his first sighting of an albino redwood within a section of the park adjacent to Roaring Camp Railroads, a tourist train that winds through the redwood forest to Santa Cruz’s Beach Boardwalk.

He thought the trees had been unnaturally colored. “I thought, ‘Wow, they sprayed it with something,’” Kuty says.

Valuable Mutations

A year and a half ago, Pittermann began her research on albino redwoods. The initial phase of her work with albino redwoods will conclude in the summer of 2011. “We want to learn how well they transport water and if they transport water faster than green ones,” she says.

Pittermann is not the only scientist trying to untangle the mysteries of the ghostly trees. Over at Stanford University’s School of Medicine in Palo Alto, California, the director of the DNA Sequencing Program, Ghia Euskirchen, is comparing samples of albino redwoods and regular green redwoods.

Like Pittermann, Euskirchen believes the albino redwoods, which she says are mutants, are at a disadvantage because they lack chlorophyll.

“One reason that the albinos can survive at all is that they are attached to the green tree and receive support from the green parent tree,” she says.

While Euskirchen is intrigued by albino redwoods, she hopes to use the mutants to learn more about the genes of regular redwood trees. “Although we are interested in the albino plants, the bigger picture is really looking at the redwood and their genome and inventorying its genes,” she says. “Because although there is a certain amount that is known about the redwood ecologically, precious little is known about the trees on a molecular and genetic basis.”

As I wander back towards the parking lot with Kutu and Pittermann, Kutu explains how having a variety of redwoods in the park—including albinos—could help the plant’s ultimate survival in the region.

“[A variety of trees] means a simple virus coming through here wouldn’t kill them all,” Kutu says.

Kutu admits that an even bigger threat to albino redwoods in the park could be the park’s human visitors, who might want to collect an albino redwood branch as a souvenir or conversation-starter.

“All it takes is one visitor in 1,000,” Kutu says, “and we have no albino redwoods at all.”

FAST FACT

Cut Off

Parent redwood trees can cut off the supply of nutrients to albino redwoods during periods of drought. During winter, most albino redwoods are brown.

In spring, feeding off the parent tree's root system, albino trees again have ghostly white foliage.

FAST FACT

Precious Plants

Redwoods are not the only plants that develop albino mutations. However, redwoods are the only species that has adapted to survive with the mutation. Other plants are unable to link their roots to healthy trees, and "starve" to death at a young age.

FAST FACT

Redwood Variations

Redwood trees have six sets of chromosomes, a much larger combination than most organisms. Human beings, for example, only have two sets of chromosomes. Redwoods can mix and match these chromosomes to develop resistance to disease or predators, such as insects or fungi. Albinism is a mutation that, as far as scientists know, does not serve a purpose.

Articles & Profiles

National Geographic Magazine: The Super Trees


website

National Geographic Projects: Redwood Transect

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