

DETECTIVE DENDRO THE DIAGNOSTIC SLEUTH

By James Komen

The Case of the Quercus Calamity

Storm season is a busy time for a consulting arborist. My phone had been ringing off the hook ever since a big windstorm had blown through town. My latest assignment was to determine the cause of loss for a large oak tree that had failed. I was contacted by insurance adjuster Dean Johnson one morning, who emailed me the basic facts of the case:

Detective Dendro,

We recently received word that a large oak failed last night on a single-family residence structure. Please visit the site, determine the cause of loss, and let us know if a layperson could have been expected to identify any pre-existing defects.

Be careful! The oak is still lying across the house. The residents have already been evacuated. They were reluctant to leave, having been residents at this location

for 30 years. But we needed to make sure they stay safe while you assess the situation. Make sure that you are extra cautious while on site!

Dean Johnson, Insurance Adjuster

Quick as I could, I nabbed Codit from the lunchroom, mid-bite, and sped off to the site.

We didn't have to check the address for this one. You could see from the street that it must have been a spectacular tree failure. A tremendous three-foot (0.9 m) lateral stem had broken off an even larger main stem of a coast live oak (*Quercus agrifolia*), flattening an adjacent garage and landing hard on the roof of the main residence. And not only that, the stem didn't just fall across the one house—it had fallen across two! Codit and I gawked at the tree from the street, slowly assembling our PPE.

Beneath the collapsed stem was a dense scattering of debris. It looked like this tree was very healthy prior to the failure. Looking closer, I saw that the most recent year's stem elongation rate was more rapid than in prior years. Growth cracks in the bark abounded along the main stem, the failed lateral stem, and every scaffold branch I could see. This tree had been growing very quickly.

In addition to the failed lateral stem, there were several other large branches growing horizontally 30–40 feet (9.1–12.2 m) away from the trunk. On many species of tree, that much weight applied at such a distance from the trunk would have been concerning, but coast live oak is known to tolerate heavy cantilever in its branches in the absence of defects.

Codit was abuzz with field notes.

I got on a ladder to look at the failure point on the eastern side of the main stem. Upon closer examination of the wound, I saw that the lateral stem did not originally emerge from the eastern side of the main stem, as initially thought. Long ago, the subject branch emerged at a narrow angle of attachment on the southern side of the main trunk and wrapped its way around the stem towards the east. Over time, the lateral stem increased in size and



Looking south (from the street) at the failed tree. A large lateral branch crushed the garage (center) and lay across the main house and the neighboring house (right).

the bark began to push against the main trunk. No new union tissue was produced in the region of contact between the lateral stem and main trunk. This region became included bark. I observed approximately 24 inches (61 cm) of included bark between the main stem and the subject branch—a significant structural deficiency!

Immediately prior to the branch's failure, the area of included bark was entirely concealed by new growth. Because of the orientation of the lateral stem prior to failure, the full extent of the included bark could not have been detected by a visual inspection.

Codit, looking up from his notes, wondered aloud, "How could the homeowner have been expected to know about this deficiency if even *we* couldn't have detected it?"

A fair question.

As part of its natural processes, the tree was depositing tissue to counterbalance the stress applied by the cantilevered lateral stem. The failed stem measured approximately 2.5 feet (0.8 m) in diameter from side to side, but approximately three feet in diameter from top to bottom. This elliptical shape indicated more deposition of reaction wood—the tree's natural response to excess stress. The tree's response growth indicated that excessive weight was being applied to the branch that failed.

Now back on solid earth, I stepped back from the tree, took in the view, and summarized: "The defect that began long ago predisposed this limb to failure. Ultimately, the weight applied to the branch union by the recent rapid growth exceeded its load-bearing capacity, and the branch failed."

My assistant hummed. "I don't see how any layperson could have been expected to know there was a problem with this tree. I mean, what kind of clue would we have been looking for, anyway?"

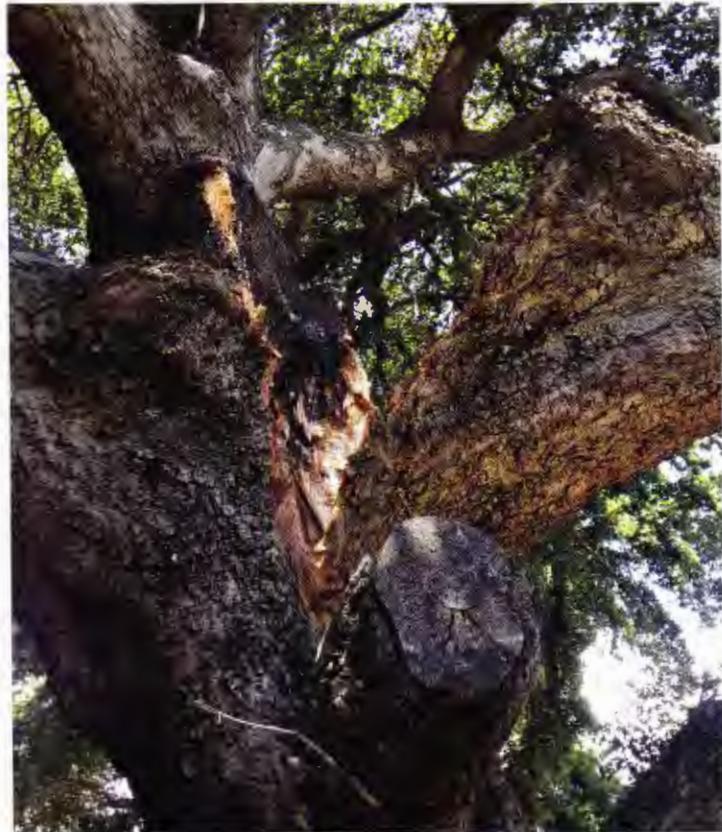
Codit strolled aimlessly to his left, humming all the while. . . .

WHACK!

"Ow!" Codit exclaimed, wobbling and then tapping the side of his helmet where he was impacted. "Thank goodness I was wearing my hard hat!"

"Easy there, partner!" I conducted a quick survey of the scene to ensure no pedestrians had wandered into the work area by accident—an old safety habit from my years as a groundworker. I then turned my attention aloft, where a piece of rusty, frayed metal hardware was dangling from high up in the canopy.

"Well, look at that!" I mused, rationalizing Codit's head just happened to locate it. "It looks like you found a clue! And I think it may change my conclusion for this case, too."

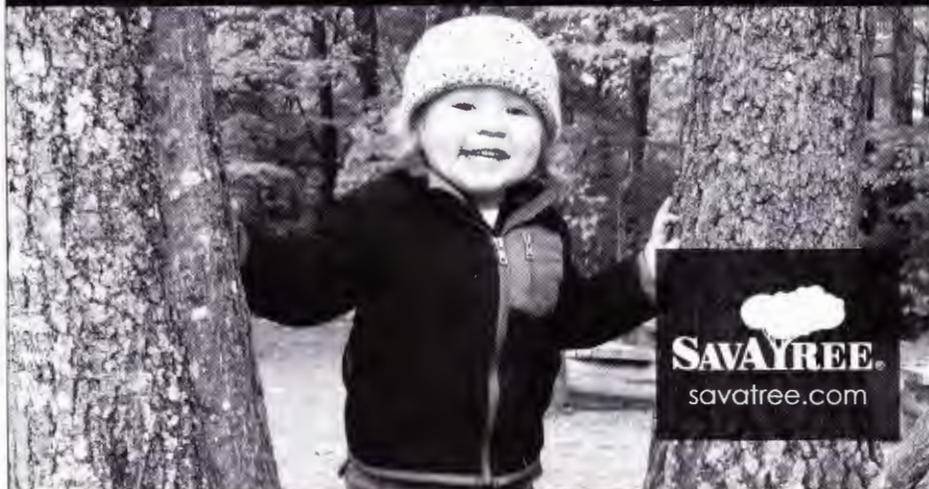


The point of failure. The younger stem wrapped around the main stem to the east, concealing a significant portion of included bark.

*What did Codit stumble upon?
Turn to page 59 to find out!*

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WHAT'S THE SOLUTION?

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The frayed metal hardware that had given Codit a bump on the head was the broken end of an old, rusty cabling system.

I rallied my binoculars in an instant.

I estimated that the cabling system was installed at least 10–15 years ago, as evidenced by its interface with a smaller scaffold branch. The outer bark had grown around one of its anchor points and completely enclosed it within the branch's heartwood. I noted to Codit that

such a process takes years or decades, so the cable must have been installed a while ago.

The cabling system was constructed with a now-obsolete method of wrapping the cable around the supported branches. This method is no longer recommended by industry best management practices because wrapping the cable around the trunk creates a constriction point that limits vascular flow and creates a weak point in the tree's structure. Current methodology for cabling a tree of this size involves drilling a hole through each supported tree part parallel to the tension in the line and securing the cable to bolts passing completely through the limbs.

"Looks pretty rusty," Codit observed. "I would have replaced that thing ages ago."

His assessment was simple but perfectly on point. As part of current best management practices, tree cabling systems must be inspected periodically for defects or changing tree conditions to ensure they still serve their intended functional purpose.

"You're right," I concurred. "The cable shows signs of wear that would certainly have been observed by an arborist if the cable had been inspected in the last two to three years. Also note that the homeowner had been living on this property since before the cable was installed. The cable was installed by the homeowner because he knew about the branch defect, so he should have been reasonably expected to have the tree inspected periodically."

Codit connected the dots. "Yikes! That doesn't look good for the insurance claim."

"Exactly. The homeowner should have known to mitigate the risk by having an arborist inspect the tree and the cabling system periodically. Unfortunately for them, that's going to have to go into my report."

Walking back to the truck, Codit clutched his hard hat, thankful for the steadfast protection he received that day. "I think what I learned today is we need to remember to look for existing hardware in a tree as a potential indicator of someone's prior knowledge of the likelihood of failure."

I chuckled to myself, placing my gear in the back of the truck and then hopping into the diver's seat. "You



The old cabling system that whacked Codit's helmet! The rust on the cable indicates it should have been inspected and replaced many years ago.

know, I just knew you would be helpful for this assignment! When there's a tough problem, sometimes you just have to put your head into it."

James Komen is a consulting arborist specializing in appraisals and tree risk assessment in the greater Los Angeles area.

Photography courtesy of the author.

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