DETECTIVE DENDRO™

THE DIAGNOSTIC SLEUTH

By Guy Meilleur

The Case of the Mutilated *Muehlenbergii*

"The trees want their leaves back, so cleaning gutters is arboriculture," I hollered from the roof over the noise of the blower at a frowning Codit below.

I stretched as far as I could, to blow out the end of the gutter. I twisted, telling him, "If the leaves are then composted on site, the nutrients are recycled and the tree system is sustainablllllll…" My boot slipped on the shingle grit and I gracelessly tumbled to the ground. What followed was agony as I wheezed and staggered to the truck. Codit jumped in and drove me to the emergency room for X-rays.

"The radiologist says you have two broken ribs," Codit told me in the waiting room as I wheezed deep, trying to focus. "I think that's why ANSI Z133.1-2006 8.1.19 says, 'The arborist shall be tied in when the work begins, and shall be tied in until the work is completed.'"

I was ready to do something rash, but the chiming in my pocket killed Codit's lecture. He pulled the phone out, put in the prescription for pain medication, and clicked the speaker on. "Detective Dendro, diagnostic service," he answered.

"Oh, thank goodness!" The woman's voice filled the waiting room, so we headed for the truck. "I've paid two arborists for basic tree risk assessments of my leaning chinkapin tree and to tell me why the bark is falling off. The first arborist said its size, lean, age, and location made the risk very high and gave me a proposal for a separate excavation and tests that seemed extreme. I sought counsel elsewhere. The next arborist saw signs of a lightning strike and said someone named Phil may have damaged it. He also thought it may be mechanical damage, but there have been no machines around since I have been here. He wanted to return with a crew for an advanced assessment, but I called you instead."

"Neither arborist did any tests that I saw," she continued, "or told me how the mark got there, or provided a prognosis on my tree's health or stability. They did not say how much pruning it needed, because from the ground, the dead branches looked like the live ones. I'm lacking information—can you render assistance?" I'd heard rapid-fire telephone monologues like that before from attorneys giving me information that could disqualify me from opposing them in a legal case.

Out of habit, I crumpled my receipt from the doctor's office, so it sounded like static. Codit leaned away as he told her our assignment and hourly rate, and she agreed. He entered her address into the phone and said goodbye, handing it to me to navigate from as he drove.

"You can chill while I do all the work," he assured me as he pulled up to the drugstore drive-through window. "You always wanted to know your work would continue if you got hit by a bus or something."

"That's exactly how I feel," I moaned, downing the maximum dosage and watering it in with a full liter. Leaning my head back, I closed my eyes and breathed deep and slow. The truck lurched as Codit turned into the driveway and hit the brakes, just short of a brick wall. The seat belt dug into my bad side like a root saw.

The client's house looked unusual, even after it stopped spinning. The 16-foot (5 m) tall, squat fortress of steel, stone, and glass

Viewed from the east, and the house, the tree sparks a quiz for all concerned.

had a 100-foot (30.5 m) tree towering Pisa-like over it, maybe 20 degrees from vertical. The client stood tall and radiant with bright blonde hair down her back and a high-collared business suit buttoned up the front. I gradually straightened as I closed the door and gingerly climbed the steps up to the patio. Codit followed with the gear.

As she approached us, I looked up. Sunlight glinted off two amazing irises, golden near the pupils, softening to copper near the whites. I was climbing a stairway to heaven, and she was waiting at the gate. "I'm Amber Amarilla. Good day, Detective, Codit. Your reputations precede you," she purred, handing me her card.

"Attorney-at-law," it said. I had to watch my step or I could be in big trouble. As if working with big, old trees was not risky enough, now I had a lawyer for a client!

"We are here to gather and interpret information about your tree," I began, pulling a chair into the shade under the eave. "Codit will take charge of this assessment. I will assist per need and analyze the data that he collects. Can you tell us your history with this tree and your goals for it, please?" I clicked on the sound recorder in my shirt pocket as I pulled out my stylus and slowly sat down to watch her and listen.

"Gladly." She spun her chair to face mine. "I bought this house 17 years ago from an architect, right after he added this brick patio. The tree was leaning then, maybe a little less. Dead lower branches were removed eight years ago. This spring, I noticed bark falling off there." She leaned to point to the curious patch, her hair swaying in the wind like *Salix babylonica*, and Rapunzel. "Now it's shaped like a question mark."

I leaned back and used my good arm to adjust the focus on the binoculars. "I can't see any other signs of damage from here," I said, sweeping up and down the trunk. "Codit can do a quick aerial assessment of the main stem and the primary forks where lightning damage is most serious. This *Quercus muehlenbergii* is called the 'yellow chestnut oak' because of its autumn color and leaf shape. With your names and physical qualities, it is fitting that this tree is yours. The wood of this species is quite durable. As owner, you might say that you have durable power of attorney over it in lieu of a conservatorship." I gave her a smile as I handed Codit the binoculars. "What do you see on that side of the tree, buddy?"

"No obvious damage… good-looking forks… trunk and buttress sound good—looks safe enough to climb, anyway. Soil smells okay—I got a sample." Codit put the binoculars, mallet, and preclimb inspection sheet back in the tool bag and grabbed his climbing gear. As he set his line and ascended, I researched the tree species on the computer in my phone.

Halfway up, Codit reported, "I see some perennial cankers on several branches. The tree seems to be walling them off alright for now, but if the tree declines, those cankers might spread. Treatments to avoid decline and periodic inspection every three years or so might stay on top of that. The buds on the dead branches look dry and snap when bent. They died due to shade. Normal."

Moments later, he was tied in near the top and phoned in his report instead of yelling it. I spun the speaker phone toward Attorney Amarilla, who turned her ear toward it and her eyes toward mine with appealing appreciation. "This tree is the tallest around. A lightning protection system might prevent an expensive removal of an irreplaceable asset. There is a little dieback of outer branches, but none more than 2 inches (5 cm) in diameter. Oh, and I passed a tree frog about 10 feet (3 m) down." Amber's golden eyes went as wide as her smile as she viewed the panoramic pictures on the phone screen, and she suppressed a giggle as the amphibian peeped at her.

"Alright then, do the tap test as you head on down," I replied, returning my gaze to the sultry solicitor. "Codit will tap the trunk to listen for hollow sounds from dead bark. Trimming away dead bark reveals the extent of damage and guides callus tissue scarring over the wood as it removes habitat for wood-boring insects. Small tools stay in that pouch on his saddle, so he is always prepared. This trunk wound has a very curious shape, and you just noticed it. Hmm… riddle me this: could we be in a Batman movie in which the Riddler attacks trees?" Ms. Amarilla pinched her lips tight and wrinkled her eyebrows.

"Okay, maybe not." I changed tack. "Perhaps a spouse, acquaintance, or partner taking out frustrations?"

She sternly shook her head to the left, then to the right. The attempted humor was not working. I forced a smile, "Excuse me while I check on Codit. Clear!"

Codit responded to my call, so I snugged the neck strap on my helmet and slowly shuffled over. Was it lightning that made that mark? Which potential treatments might mitigate the tree's condition? What residual risk would remain after what treatments? And who was this Phil guy? I rested my hands next to the question mark and tapped it absentmindedly as I looked up to Codit, then looked down to the ground. I closed my eyes and felt for the answers, coming straight from the tree. *Turn to page 46 for the solution.*

WHAT'S THE SOLUTION?

Codit slid down to the ground and unhooked his saddle, his thumbs-up telling me the tree was free of lightning damage. "Before you remove your rope, how about doing some exploratory work here?" I pointed to the girdling root visible on the buttress below the question mark. "A basic assessment should include seeing the base of the tree, right? No prescription without diagnosis—," I added. Amber nodded with the certainty of a judge. "No Rx without an RCX."

Codit handed me the mallet and grabbed the shovel. I felt the slightly shriveled and sunken bark above the question mark and tapped and pried off loose, dead bark.

The woundwood felt thick and hard under my fingertips, the richest source of tactile feedback on the body. Mechanoreceptors, packed under the ridges that form my fingertips, felt many years' worth of growth in the texture of the lignified callus.

"The age of the wound, its height above grade, facing the patio—it looks like 'grader gash' from construction activity," I told Amber. "Codit has removed another patch of dead bark from that concave area to the south. It's unlikely to be caused by contact.

"Right," Codit agreed. "First, I removed this black and crumbly fill dirt, and small girdling roots, from the buttress. Where the fill was deepest—16 inches (40 cm)—there is serious decay at the soil line and below. The bark decayed downward 4 inches (10 cm) where the tree responded by building up callus and growing adventitious roots.

Lacking oxygen below, roots grew up, then back toward the trunk. Some I straightened and buried away from the tree, but some were too stiff and had to be cut. Those roots could have been sustainably nourished by decaying wood tissue, so I cut the minimum needed to expose the wound. I replaced with porous soil up to the dead area to nourish new roots, and perhaps sprouts, to feed the callus and speed the closure."

"The decayed area is open to air and light, and this trench channels water away from the tree," he continued. "I found no conks, mycelia, or other evidence of identifiable biotic pests at work. It appears that this is primarily abiotic damage from high moisture and low oxygen from the fill that made a level patio and lawn area."

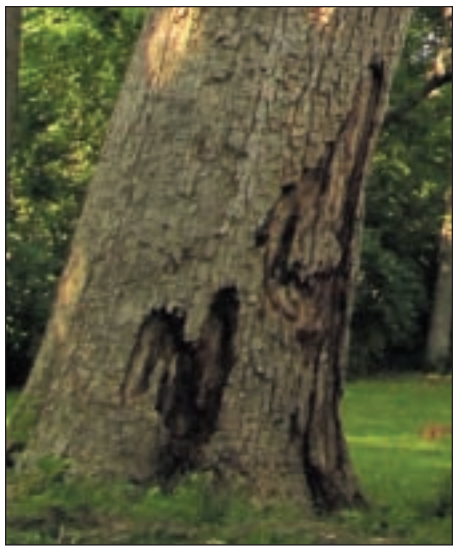
Codit set aside his list of the Top 5 Decay Fungi for our region. "A trench should be dug to drain excess water from this infected area. The north side of the tree appears to be near original grade. The buttress spreads normally; just one stem-girdling root was removed. That side of the tree has no fill, no bark loss, and no decay."

"Excellent work," I said. "There are no signs of interior decay, so invasive testing is not indicated. The critical area is now this 2-inch strip of bark between the wound from the machinery and the wound from the fill. Amber, I think that's who 'Phil' was, the fill dirt that caused the basal infection.

It's now advancing toward the older wound, and the tree's defenses are down. If the wounds coalesce, they are unlikely to ever close over. Risk of failing at this point will probably increase if decay spreads inside faster than compensatory tissue is formed on the outside."

"Oh dear!" She looked at the load of biomass looming overhead. "I plan to retire and move out in ten years. What can we do to mitigate this risk?"

"No tree is without risk, and my written report will include the soil results," I began. "Dead wood could come out for health and stability and to better monitor the tree's response to treatments. Live branches over the house could be pruned back to lessen overall lean and reduce the load on the decaying areas. Branches should be reduced back to concentrations of vitality, primarily at upright laterals. This shortens the lever arm right away, and more so long-term, by triggering more interior growth. Lightning protection is warranted, given the tree's height and location. A system could reduce lightning risk by 97 percent. The conductor could go under the rock and pipe in the drainage trench to that low spot in the corner, and connect to an 8-foot (2.4 m) ground rod.



Viewed from the south, the question mark wound (upper right) from grader gash spreads down. The newer wound (center left), from the basal infection where "Phil" stuck, spreads up. Will they meet?

"As much fill dirt as possible should be removed, but no roots thicker than your little finger. The rest of the soil should be aerated at least 1 foot (30 cm) deep, which my soil probe shows is the average depth of the fill in the yard. This tree is a good candidate for radial trenching to improve soil aeration, root function, and drainage. Bigger roots would be disturbed during radial trenching, so this procedure is best timed for autumn. We recommend ISA Certified Arborists who have experience with these tasks," I said, handing her a short list of local arborists. "Your objective of good tree health and structure for ten years could be met if the right specifications are followed. The tree should be inspected every summer from roots to shoots. In particular, these wounds should be monitored for scarring and rotting. It will be a race between those two processes for the fate of your asset in this tree."

"I understand completely," Amber smiled tensely as she pulled out her checkbook. "Thank you so much for your systematic and comprehensive assessment. When your condition improves, please send me your report with mitigation work specified. I see now that a basic tree risk assessment is a very worthwhile investment when the arborist inspects the tree's essential attachment to the earth. My tree and I are both fortunate that you came by today."

"'Your report will arrive via email." I accepted the check and gently bowed, quietly turning off the voice recorder as I held her amber gaze. "Another feature of your house that I like—it has no gutters."

Additional Reading:

Schwarze, Francis W.M.R. 2008. *Diagnosis and Prognosis of the Development of Wood Decay in Urban Trees*. ENSPEC. 336 pp.

Sternberg, Guy, and Jim Wilson. 2004. *Native Trees for North American Landscapes*. Timber Press, Inc. 552 pp.

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