

DETECTIVE DENDRO THE DIAGNOSTIC SLEUTH

By James Komen and Dawn Fluharty

The Case of the Ruptured Root Crown

Flu season. Ugh.

I rubbed my shoulder where I had received a flu shot last week. It was still sore; such is life. At least it was better than having the flu. I tried to push the dull ache out of mind and focus on my work.

But as fortune would have it, Codit stuck his head in my office at just that moment with a new assignment.

“Hey, Detective, we just got a call from Brock at the City. He wants us to examine some London Planetrees (*Platanus × hispanica*) along the street. He thinks that four of them are going to fall over.”

I jumped up, excited to offer some last-minute consulting advice. “My goodness! Let’s go take a look!”

We hurried over to the site and were there within twenty minutes. It was a residential street a few blocks from the downtown shopping plaza. The street was lined with mature California Sycamores (*Platanus racemosa*). They were all heading into dormancy with only a few leaves hanging on to the branches. Interspersed with the California Sycamores were some London Planetrees of approximately the same age.

I saw Brock up ahead, standing next to an area he had crudely blocked off with some cones. He kept nervously looking up at four London Planetrees in a line and turning cars around before they came within the protected area. When he saw us, he motioned for us to park a few houses away. Hard hats on, we walked up to meet him.

“Thank you for coming out so quickly, Detective,” Brock greeted us.

“Absolutely. What seems to be the trouble?” I replied.

Brock explained. “I was performing a Level 1 Limited Visual Assessment of the trees on this street this morning. As you know, the City has a proactive inspection policy, and we try to inspect our inventory trees at least twice per year.”

Codit and I nodded. Brock motioned for another approaching car to turn around as he continued.

“So I happened to look down and see a triangle-shaped injury at the base of four of these London Planetrees. But not just one; there are several! I know from experience that when roots are severed, decay can enter through the exposed root end and travel back towards the trunk, hidden underground. And the aboveground symptom of the root decay appears as a triangle of bark loss at the base of the root crown, but only after the latent defect has spread. So now I’m concerned that these trees have root rot and are about to fall over.”



A residential street lined with a mix of *Platanus* spp. What is wrong with the London Planetrees?

Brock's description of the symptoms of root loss was correct. Often when roots are cut, there are no above-ground symptoms that appear on the tree for one or more years following a root injury. And by the time bark loss does appear at the base of the tree, the root rot can be extensive.

"When did that sidewalk go in?" I asked him.

"The sidewalk was replaced about a year and a half ago," Brock replied. "I thought we were very clear with our contractors that all roots should be preserved when the sidewalk was replaced. But now here we are!"

I nodded again, pondering the situation. "Did you see the trees moving around in the soil? Was there a sudden change in the angle of lean?"

"No movement and no change in lean," he said. "But I suspect there was some significant root cutting when the sidewalk was replaced, judging by the number and size of those wounds, and I don't want to take any chances."

With this additional information, I felt a little more comfortable approaching the trees to inspect them. It is always important to avoid becoming a victim by approaching an unsafe tree for an inspection. Apparently nothing about their condition had changed in the past year, but nonetheless, I kept my distance and approached from the side opposite their prevailing leans.

As Brock had described, there was a prominent pattern of several narrow, triangular wounds arising from ground level at some of the buttress roots of each of the London Planetrees. The most prominent wounds were closest to the sidewalk on each tree, but it looked like the pattern continued around the entire circumference. Perhaps some roots had circled around the trunk and had been damaged by the sidewalk construction?

From a distance, I could see there was some heartwood exposed in the center of each of the wounds. There was a very small line of callous wood beginning to form around the edge of the wounds, indicating each tree had only just recently begun to respond with woundwood. That pattern of bark loss did look an awful lot like what happens when tree roots are cut and decay progresses back to the trunk.

Gingerly patting my sore shoulder, I mulled over this information aloud. "I see the wounding at the bases of these trees, but it seems that only the London Planetrees have it. It looks like the entire sidewalk was replaced along this street. Shouldn't all of the trees have been affected?"

Codit offered an idea: "What if the London Planetrees have different root systems that were more susceptible to root damage than the California Sycamores when the sidewalk went in?"

I considered the theory, but the idea didn't seem right to me. Most roots of both species tend to be found in the upper 36 inches (91 cm) of soil, and most of the fine absorbing roots are found in the upper 12 inches (30 cm). Absent any additional information, I didn't see any reason why the London Planetrees were any more likely to sustain root injuries from the sidewalk replacement.



Triangular-shaped wounds at the base of one of the London Planetrees. Does this indicate a root injury below the surface?

"I know you'll figure it out, Detective!" Brock said, clapping me on the shoulder encouragingly...the *wrong* shoulder. Ouch! I nursed my bruise. He saw me wince and apologized immediately.

"No problem, Brock," I reassured him, "But now I think I know what these trees are going through!"

"What do you mean, Detective?"

Is Detective Dendro getting sympathy pains for the trees? Or did he find a clue? Turn to page 64 to find out!



WHAT'S THE SOLUTION?

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I turned back to Brock. “Did you perform trunk injections on these trees within the past two years?”

He was caught off guard by my question. “Why yes. We’ve been applying Propiconazole as a treatment for *Anthraconose*, the common foliar fungus that affects these trees. In fact, we were scheduled to administer treatment in another week or two, but it probably won’t happen until next month.”

Codit piped up. “That seems odd to be injecting in dormancy. Isn’t fall the recommended time of year to perform that treatment?”

“You’re right,” Brock admitted. “The recommended season is fall, but we always seem to be running behind schedule. So every time we inject during dormancy, we bump up the pressure to compensate for the reduced rate of uptake from the canopy.”



Wounding on a buttress root caused by a trunk injection.

Oof. Not good. I tried to be as diplomatic as I could in my response. “Brock, I think that the roots of these trees are still intact...”

“That’s great news, Detective!” He seemed pleased, but then he realized there was more. “...but...”

“...but, I believe these wounds were caused by improper trunk injection techniques,” I stated.

I walked up to the trunk of one of the London Planetrees and pointed to the wounds. “Each of these wounds is at a regular interval around the trunk on the buttress roots; these were the injection sites. Those small holes in the center of each wound aren’t exit holes from insects; those are the injection holes drilled by the arborists that administered the last treatment. Xylem injection systems apply pressure to push the product into the xylem tissue so the tree can transport it to the rest of the canopy, but when there is no place for the product to go, it will push back out of the tree.

“In order for the injected product to be taken up into the vascular tissue, there needs to be some passive transport force pulling the product up the stem. That happens when trees are in leaf. But when injection occurs during dormancy, there isn’t sufficient movement of the water column for the tree to uptake the product into its stem. Some arborists administering the injection will increase the pressure to compensate, as your crew has done, but that can lead to the injuries we see here.

“And sometimes, even if the recommended pressure guidelines are followed, the same bark loss injury can occur. This happens because the injection sites aren’t drilled deep enough to get to the xylem tissue. The product gets released between the bark and the cambium and not into the xylem tissue, and it creates a pocket where the cambium tissue is damaged and the product just sits at the base of the tree. The resulting tissue death is hidden from view until the dead bark sloughs off several months later.”

Brock followed my explanation, but it clearly didn’t sit well with him. “But we treated this whole street with the same system at the same time. Why would the London Planetrees show these symptoms and not the California Sycamores?”

“California Sycamores are semi-ring porous, but London Planetrees are diffuse porous,” I explained. “When trunk injections are administered in dormancy, there will be more resistance from the vascular system of diffuse porous trees than from semi-ring porous trees because there is less available pore space. What likely happened is your team increased the pressure on the London Planetrees because the product was meeting resistance and moving slower than in the California Sycamores. The increased pressure resulted in the tissue damage we see here.”

“So the good news,” Brock summarized, “is that the injuries are confined to the outer layers of tissue. Does that mean these trees aren’t at an elevated likelihood of failure?”



Close up of the wound showing the injection hole partially covered by a new layer of woundwood.

“That’s correct,” I said. “Now that I’ve had a chance to inspect the root collars, trunks, and crowns, I don’t see any reason why these trees are any more likely to fail than the others along the street. Although the outer tissue layers were damaged, the heartwood appears to be intact. I would rate the likelihood of whole-tree failure within the next one year time frame as *improbable*.”

Brock breathed a sigh of relief. He waved several oncoming cars through and began to collect his cones.

It was unfortunate that the London Planetrees on the street sustained some injuries, but it appeared that they were capable of rolling woundwood over the areas of damaged bark and had a good chance of recovering over the following five to seven years.

Brock thanked me for the advice. “I’ll try to be more cognizant of tree species next time we administer injections. My four takeaways from today are: be more careful with injections on diffuse porous trees, perform injections during the recommended season, follow the manufacturer’s recommended pressure rates, and make sure that the injection holes are drilled all the way into the xylem tissue when using a xylem injection system.”

“That sounds like a solid plan, Brock,” I said. Codit grinned. “Looks like these trees have still got a *shot*.”

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