



DETECTIVE DENDRO THE DIAGNOSTIC SLEUTH

By Dina Mysko

The Case of the Ailing Avenues

The cold, dark nights were drawing in. It had been a long day and my muscles craved warmth. I sat by the fire in my old leather club chair, cupping a glass of crisp cognac, reflecting on past events. The ISA Annual International Conference in Orlando, Florida, U.S., now seemed a distant memory, and the climbing competitions were all wrapped up for the year. Beyond our commitment to the TCI Expo in Pittsburgh, Pennsylvania, U.S., I figured Codit and I had a bit of time on our hands.

And at that thought, Codit wandered in.

“Evening, Dendro.”

“Evening. You know, you may want to consider packing some extra things for our trip up to the City of Bridges.”

“We heading north to watch the Steelers play?”

“Not exactly. How are your sea legs?”

Codit was cautious. “Well, it’s been a while. I used to sail with my uncle, on occasion, to southern Europe. He used to pack and send cargo out of a shipping yard in Philly. But I haven’t seen him in a while. . .”

Good enough, I thought. “Codit, call your uncle right away and see if he can fix us two tickets. I’ve always dreamed of seeing the south of France!”

The journey across the Atlantic was a little rough—not exactly been what I had in mind—but as soon as we entered the tranquil Mediterranean waters it was smooth sailing. In the distance, the picturesque coastline gave me calm. I breathed in the warm air as we approached the Port of Marseille. I could almost smell the onion soup.



JEAN-LOUIS VENET; WIKIMEDIA COMMONS

Planetrees not too different from these are showing curious signs of decline that Dendro must investigate. Monsieur Dubois’s trees have yellowing, curling leaves, as well as peculiar branch lesions.

After a peaceful night's rest at a local guesthouse, I felt re-energized. I threw back the shutters to catch the early morning light, dappling the tree-lined sandy square opposite. Codit was slowly stirring.

"Bonjour, Codit! Get dressed, we're off to the Camargue Natural Park, a UNESCO wetland reserve. I also need to brush up on my ornithology."

Codit was a slug, so I figured it best to grab some croissants and coffee on the way. We walked across the square to the Café Arboré.

"Bonjour, monsieur." I greeted the man across the counter.

The man, kneading dough, returned my greeting with an indecipherable mumble. He continued hastily kneading the dough.

"Hello, monsieur. Can I help you?" A voice turned my head and my eyes lit up at the beauty holding the tray before me, dark hair caressing her shoulders.

"Please," she added, "excuse my boss, Jean Dubois, he's a little rushed this morning."

"Bonjour, mademoiselle. . ."

"Madame Bella Platane, monsieur."

"M-my friend Codit and I would like two croissants and . . . uh. . ."

Admittedly, my eyes wandered—deep brown eyes, perfectly formed curves. What was I there for, again? Croissants and . . . what?

"Certainly, monsieur. Would you like coffee too?" Bella asked politely.

"Oui, merci madame!" My pronunciation might not be perfect, I thought. Maybe I'll try and impress her with a little arboricultural knowledge instead.

"I was admiring the *Platanus × hispanica* (London plane or sycamore) lining the square. Its parent species, *Platanus orientalis* (oriental plane) and *Platanus occidentalis* (American plane or sycamore) were brought together to create this robust hybrid. Those strong scaffold branches look magnificent. The autumnal leaf colors show that the chlorophyll pigment is breaking down into useful nutrients, such as nitrogen, which the tree can store throughout winter. This allows other pigments to be displayed, such as carotenoids, which reflect yellow and orange light, thus displaying the attractive colors we see."

I could tell Bella was enchanted. I continued: "The bark, which flakes off to create that distinct camouflage-like appearance, is the tree's way of self-cleansing as it's exposed to pollution. The younger shoots and leaves also help remove harmful particulates from the air. And not only are these trees extremely pollution-tolerant, but they can also survive in very poor soil conditions, help reduce your café's energy consumption through shade and cooling, and help block wind. The London plane is perhaps the most cost-effective tree species for urban planting due to its longevity, large canopy, and ability to reduce atmospheric carbon dioxide while locking up large amounts of carbon."

Jean Dubois stopped kneading. "Excuse me, monsieur, but how do you know so much about our trees?"

"My assistant and I are arborists!"

"We have an avenue of these trees where I live," Jean responded. "The local arborist, Robert Grimpeur, prunes them regularly. He hasn't been able to come this year though, he's too busy working by the canal near Béziers. But my trees, I've been a little troubled by them lately. They're not as attractive this year. Perhaps the dry summer hasn't helped. Would you mind looking at them?"

I nudged Codit with my elbow. The poor guy was asleep on his feet. He needed caffeine a lot more than he needed a lecture.

"Certainly, monsieur Dubois, Codit and I can come and look right away, if you're free," I replied. "But for now, let's stick with croissants and coffee."

Well, so much for the birdwatching, I thought, as we left the café and the beautiful Bella Platane behind.

The plane trees lining the Rue Têtard were typical of the French avenue and were a good example of pollarding when it is done correctly. However, these mature specimens were certainly looking a little weary.

"Monsieur Dubois, when were these last pollarded?" I suspected it had been for two years.

"It would have been the winter before last, so, two years ago?"

"And when did the leaves change color?"

Jean mumbled, doing the math in his head. "It was much earlier this year, late July or early August. They looked tired so suddenly, turning yellow, curling up. Could it be drought?"



The client's planetrees are looking a little weary.

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I turned to Codit, now officially awake. “What do you think?”

“London plane can usually withstand drought,” Codit said, narrowing his eyes at the base of the tree. “I was considering a case of chlorosis—nutrient deficiency—a lack of iron perhaps.”

“Well, planetrees are commonly planted as street trees because they are able to tolerate very poor soil conditions. However, I don’t think the soil is the root cause here,” I said, bringing Codit’s attention back to the canopy. “It appears we have some dieback in the crown.”

“Oh! Dieback, yellowing, curling leaves . . . could it be *Verticillium* wilt?” Codit asked. “The soil-borne fungal pathogen infects sapwood and causes yellowing, wilting, dieback, and necrosis.”

“Not likely, my dear assistant. *Platanus* species are resistant to it. Consider the symptoms you can see and try to recall another pathogen that specifically affects London plane.”

Judging by Codit’s furrowed expression, he was digging deep. The coffee must have done the trick.

“Massaria!” he blurted. “This looks like Massaria disease, caused by the fungus *Splanchnonema platani*, formerly *Massaria platani*.”

“Close,” I said. “What we have here *does* have similarities to Massaria, such as branch dieback and dark lesions on some of the branches. However, Massaria is not ailing this avenue.”

I approached one of the main stems and gestured to the bark. “Monsieur Dubois, I have the answer to your ailing avenue.”

Turn to page 74 to see what is afflicting the avenue of planes.

2015 TREE Fund Grant Awards

The Tree Research and Education Endowment Fund (TREE Fund) has announced the first of its 2015 grant awards, totaling nearly USD \$80,000 to support urban tree research, scholarships, and arboriculture education in the United States and abroad. The TREE Fund awarded a record \$303,000 for tree research and education in 2014, and has disbursed more than \$2.6 million since its inception in 2002.

The TREE Fund awarded a total of six scholarships and three arboriculture education grants for the 2015–2016 academic year. New in 2015 were two scholarships funded by the ISA Penn-Del Chapter—the Fran Ward Women in Arboriculture Scholarship and the Horace M. Thayer Scholarship—available to aspiring arborists from Pennsylvania and Delaware. For a complete list of Research & Education Grant awardees and scholarship winners, visit the TREE Fund website (www.treefund.org). Highlights follow:

\$25,000 Hyland R. Johns Research Grant

Jason Miesbauer, Ph.D. (The Morton Arboretum) and Andrew Koeser, Ph.D. (University of Florida), for the project, “Assessing wound-induced response growth in two common urban tree species.” Dr. Miesbauer and Dr. Koeser will measure how response growth from intentional wounding affects tree strength over time, providing better guidelines for risk assessment of trees with decay or injuries.

\$24,948 Hyland R. Johns Research Grant

Andrew Hiron, Ph.D. (Myerscough College, UK), for the project, “Improving urban forest establishment, resilience and performance using trait-based tree selection.” Dr. Hiron seeks to develop quantifiable trait-based guidance for a wide range of tree species that can be used by arborists, urban foresters, landscape architects, and tree

nurseries to help establish a resilient urban forest in times of climate change.

TREE Fund education grant recipients for 2015 include: Toledo (Ohio) Botanical Garden – \$5,000 TREE Fund Arboriculture Education Grant. “From TREES to STEM!” offers hands-on, inquiry-based experiments and outdoor explorations for 400 inner-city children, deepening their understanding of the role they play in protecting and enjoying the natural world around them.

Forest ReLeaf of Missouri – \$5,000 TREE Fund Arboriculture Education Grant. “Forest ReLeaf in the Classroom” is an interactive program for students in grades K-12 offering instruction in basic biology and emphasizing the environmental impact and social benefits provided by urban trees.

Cuyahoga River Restoration – \$5,000 Ohio Chapter ISA Education Grant. “Tree Training Intensives” provides workshops for community leaders, Tree Commission members, and students considering careers in arboriculture and urban forestry. Site-specific workshops at Ohio Great Lakes Areas of Concern emphasize the role of healthy forests and tree canopy in restoration and protection of Ohio’s watersheds and Lake Erie.

Scholarship winners for 2015–2016 include:

- Brady Hendricks (Kansas State University) – Robert Felix Memorial Scholarship
- Lee Rumble (Middle Tennessee State University) – Robert Felix Memorial Scholarship
- Andrew Ronan (Paul Smith’s College) – Robert Felix Memorial Scholarship
- Jamie Lee Kempton (University of Hawaii at Manoa) – John Wright Memorial Scholarship
- Taylor Souders (Pennsylvania State University) – Fran Ward Women in Arboriculture Scholarship
- Harley Heichel (Pennsylvania College of Technology) – Horace M. Thayer Scholarship **A•N**



WHAT'S THE SOLUTION?

I turned to my client, confident. "Monsieur Dubois, I believe we have a serious case of *Ceratocystis platani*, formerly *Ceratocystis fimbriata* f. *platani*, known as canker stain of plane or planetree wilt. It is a fungal pathogen, causing "canker stain" disease and wilt in planetree or sycamore trees. The pathogen enters the xylem in the vascular cambium through damaged wood, or it passes from tree to tree through root grafts. Beetles may also be vectors, carrying fungal spores from tree to tree. You mentioned that your local arborist usually pollards these trees?"

"Y-yes, monsieur Dendro," Jean replied with curiosity.

"And you say that he has been working by a canal?"

"Yes, monsieur."

I was afraid so. "Jean, I think I know the cause of infection, and I'm afraid you are not going to like it. You see, another way of infecting planetree with canker stain is via contaminated pruning tools and from machinery that damages roots.

Your arborist may have accidentally introduced the pathogen last time he pollarded the trees here. The fungus can survive and develop for several years inside the tree if the temperature range is adequate, 10°C to 45°C (50°F to 113°F). It can even sustain in freezing temperatures as low as -17°C (1.4°F) and also lay dormant in soil for several months as long as the temperature doesn't exceed 35°C to 40°C (95°F to 104°F)."

There was only one canal that I knew of—the Canal du Midi, a remarkable feat of engineering—which linked the Mediterranean with the Atlantic. It's one of the oldest manmade waterways in Europe, built in the 1600s and now a UNESCO site.

I added, "The impact of canker stain of plane has been significant here in France, with around 42,000 London plane potentially infected along the Canal du Midi alone, which I believe is where your arborist may be working. The planes were originally planted in the 1860s along the canal to help reinforce the banks and to provide shade for barges and boats. Unfortunately, the mooring of those vessels has resulted in damage to the trees, which has consequently created a pathway for infection."

Jean, understandably, looked terribly worried. His eyes darted from me to Codit and then back to me again. "Is there any way of treating this canker stain?"

"I'm afraid there is currently no known cure," I replied carefully. "Once the fungal pathogen has entered the vascular cambium, it produces staining in the sapwood, which can extend longitudinally at a rate of 50 to 100 cm (19.6 to 40 39.4 inches) per year through the xylem vessels and along the medullary rays and into the heartwood. The yellowing leaves or chlorosis you have observed is usually the first symptom displayed. Other areas of infection may be visible as dark bluish/violet lesions and cankers in the stem or branches as displayed here. These symptoms, along with severe leaf wilting, bark necrosis, and girdling, will eventually lead to tree mortality."

Codit acted as my laser pointer, indicating on the leaves or stem the various visible symptoms.

I continued: "The pathogen can be correctly detected and identified using both traditional observation techniques and with laboratory methods. If you go the route of microbiology, then potentially infected samples may be isolated on potato dextrose agar or carrot agar, which allow the pathogen to develop if it's present. Infected trees decline rapidly and can die within three to seven years. The current disease control is removal of the infected trees and burning them to stop the spread, but in a lot of places, you can't burn! In those locations, the tree may need to be sent to a landfill."

Codit nodded. "I recall my uncle telling me about a disease that impacted the American plane prior the 1950s. As many as 80 percent of trees were affected and removed in some areas in the eastern United States and in California. The felled timber was then used to produce shipping crates during World War II. If that timber was infected, then perhaps that is how canker stain was introduced into Europe."

"Precisely, Codit. Canker stain can affect London plane and its parents, American plane and oriental plane. French specialists believe that it was introduced into southern Europe in the 1940s, through a number of ammunition boxes made from infected American planetrees from the eastern U.S. Reports of canker stain were recorded in Barcelona, Marseille, and across Italy. The disease then spread rapidly into Italy and Switzerland, and more slowly through France.



A cross-sectional view of deep canker stain.



Damage to trees are a prime pathway for infection.

“However, the spread through France has accelerated in the past decade, and it’s now present in Greece as well. It’s not known why the disease is less significant in the U.S. It’s perhaps attributed to greater species diversity and wider distribution of planetree species, which is less in the U.S. relative to Europe.”

I had Jean’s full attention, and this convenient intersection of world history seemed to mesh with Codit’s uncle’s story as well.

“All in all,” I concluded, “we’re witnessing a disease which could change the urban landscape significantly and in a short period of time. If we work together, on both sides of the Atlantic, then perhaps we can stop the spread and eradicate this deadly disease—by preventing the movement of infected stock, cuttings, sawdust, and soil; applying sanitation methods and ensuring pruning tools and machinery are disinfected and washed; and continuing to survey susceptible plane species, including the London plane.”

Jean was deeply saddened. “Monsieur Dendro, thank you for your expertise. Is there something I can offer in return?”

“Well, I hear you make the best onion soup in France!”

Dina Mysko was an ISA 2015 student fellowship recipient and served as an intern to ISA’s Educational Goods and Services Department.

Figure 2, Figure 3, and Figure 4 first appeared in Diseases of Trees and Shrubs, second edition, Cornell Univ. Press, and are reprinted with permission of the authors.



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