Times-Standard
Times-Standard / Humboldt Beacon

Not My Fault: An unexpected summer geologic excursion

Lori Dengler/For the Times-Standard
Posted August 6, 2022
https://www.times-standard.com/2022/08/06/lori-dengler-an-unexpected-summer-geologic-excursion/

I was recently in the Napa Valley for a six-week post knee replacement checkup. We had a couple of hours to kill before the appointment and my husband Tom Lisle noticed "Petrified Forest" near Calistoga on the route from Santa Rosa to St. Helena. I'm fond of roadside attractions and agreed to check it out. I had few expectations. I knew there had been volcanic eruptions in the area and figured maybe they were hyping some tree casts.

What a fortuitous stop. Yes, there were real petrified trees – great stone giants that lay claim to being the largest petrified trees anywhere in the world. And there were interesting backstories, and it wasn't fraudulent in any way.

The Petrified Forest is a California State Historical Landmark that has been owned by the same family for more than a century. It features a half mile loop and another half mile spur. The terrain is gentle – just the perfect rehab walk for my knee. A number of trees have been excavated with interpretive signs.

We learned that the forest had been discovered by homesteader Charles Evans in 1870 who noticed the tip of a rock-solid stump poking out of his pasture. His observation drew paleontologists who examined the stone tree and, of course published papers. Yale paleontologist O.C. Marsh wrote, "A Fossil Forest in the Tertiary of California" in 1871. The redwood species Sequoia langsdorfii was officially recognized a few years later.

Eight trees are featured at the park. The largest is named "The Queen," 8 feet in diameter and 65 ft. long. From the growth rings, it was estimated to be 2000 years old when buried. "The Tunnel Tree" is one of the best preserved. Branch sites can still be seen along its 120-foot length.

What caused the demise of these trees? The evidence was everywhere. A thick blanket of tuff blanketed the site. Tuff is welded volcanic ash. When the hot volcanic particles rain down during an explosive eruption, the fragments fuse together and become rock hard. Tuff is always a sign of a violent eruption. Like Mt. St. Helens in 1980, gas-rich magma becomes uncorked as it rises to the surface, the overburden of rock no longer sufficient to contain the gas.

There was another similarity to Mt. St. Helens. All of the Napa petrified trees had the same orientation. Tom had worked at Mt. St. Helens in the first months after the 1980 eruption. He was a Forest Service research scientist and much of the Mt. St. Helens impact zone was on National Forest Land. Tom is a fluvial geomorphologist, a specialist in the mechanics and evolution of rivers and sediment transport. The Mt. St. Helens blast zone provided an enormous laboratory to study what happens to rivers when an unexpected load of sediment is deposited.

I was able to join the Forest Service research team for a week in July 1980. It was my first onsite disaster experience, and I was in awe. But it was the blast zone that really took my breath away, acres and acres of old growth Doug Fir trees all pointing in the same direction. The parallel tree fall orientation in Napa was a figurative smoking gun for a lateral volcanic blast.

There were a number of interpretive signs about the volcanic origin of the forest. The blast occurred about 3.4 million years ago, and the source was the Clear Lake volcanic field. The blast leveled the trees and buried them beneath a thick blanket of ash. The ash solidified and over the next millennia, rainwater seeping through the deposit became saturated with silica, soaking the entombed logs and slowly replacing the organic materials with silica. The process was so slow that even tiny structures in the wood were perfectly preserved.

The trees in the petrified forest look like redwoods even to my novice eye. The thick corrugated bark is now a stony gray, but it doesn't take any stretch of the imagination to see these as the tall trees they once were. They haven't gotten the attention of the far more famous petrified trees of Arizona. They aren't as old, widespread, or as colorful. But they are bigger and a lot closer.

The Petrified forest left me with a lot of unanswered questions so when I got home, I started sniffing around the internet and asking friends and colleagues what they knew. The source of the eruption was not Mt. St. Helena, as the park material implied, but rather a vent a bit to the north. Mt. St. Helena is not the remnant of a volcano, but rather a complex of volcanic rocks shaped by later erosional activity.

I never thought of the Napa area as a volcanic one, but much of the county is underlain by volcanic rock and it

plays an important role in the nurturing the area's famous varietals (https://www.smithsonianmag.com/science-nature/why-earthquakes-make-napa-valley-wine-great-180952466/).

Why there is any volcanic activity in the region is a more interesting question – one I tiptoed into before in this column (The Clear Lake Volcanic Enigma 12/6/2020). The most likely areas for volcanic activity are hot spots like Hawaii and Iceland, or subduction zones like Tonga that produced the explosive blast last January. The Clear Lake activity is more complicated and likely related to the northern growth of the Mendocino triple junction (see https://rctwg.humboldt.edu/capemendo92). As the triple junction moves, it creates a thinner crustal zone behind it allowing much hotter mantle rock to come closer to the surface.

The Petrified Forest is only one small area where the evidence of that eruption 3.4 million years ago has been preserved. There are scattered spots throughout the region where not only trees, but other plants have been found. It is a veritable paleobotanist's paradise.

My second knee is scheduled for surgery in October so I will have several more opportunities to explore the volcanic nature of the Napa Valley. It's the plus side to being a geologist..

Lori Dengler is an emeritus professor of geology at Cal Poly Humboldt and an expert in tsunami and earthquake hazards. The opinions expressed are hers and not the Times-Standard's. All Not My Fault columns are archived online at https://kamome.humboldt.edu/resources and may be reused for educational purposes. Leave a message at (707) 826-6019 or email rctwg@humboldt.edu for questions and comments about this column, or to request a free copy of the North Coast preparedness magazine "Living on Shaky Ground."