

The Forest for the Trees

Janis Norton

The path was lightly crunchy underfoot. “Green crush” they call it and it is for the least intrepid hikers amongst us. A fair description of me and my spouse. There we were at the national park and glad to find it fulfilling its promise to be ten degrees cooler at the higher elevation and under the tree canopy. Miles below us our town sweltered in the mid-August heat. Weeks of little rain had left us with brown grass and only the hardiest of roses clinging to a bit of color. But here, winding up the mountainside, we found the road lined with tall grasses and colorful wildflowers. The forest was cool green and blessedly quiet.

We spent about an hour on the shaded path, ambling slowly and breathing in the forest air. It was a visit which ended with my thinking that I had taken in a lot of interesting sights. My husband pointed out several soft brown deer feeding on bushes just a few feet off the trail. Four delicate faces looked at us curiously before turning back to foraging and munching leaves. There was also a lone chipmunk, then a pair of squirrels chasing up a tree, and later a dark hawk gliding overhead. I commented that there must be a dozen or two different types of trees around us. The pines and the leafy trees were clearly different but within those categories they all seemed to resemble each other quite a bit. How different could a maple be from a beech, after all?

Our attention was most arrested by gravel rectangles randomly hinging off the path, lined with stone. How were they used? We were also struck by the large number of fallen trees and limbs nestled in among the living. Why didn't the park haul them away? They seemed an eyesore. We speculated that maybe the park budget couldn't accommodate expenses like tree removal. Such a shame. What good could come of dead wood on the ground, after all.

Weeks later it's another trip to the forest and this time for a park sponsored seminar on trees. The mid- September air is very cool and I return to my car for the heavier jackets my friend and I had brought. The forest rangers, Matt and Amy, motion to the class to gather round at the trail head. After a morning spent watching slides and listening to lectures, we are ready to venture into the forest and try out our identifying skills. I clutch my tree finder booklet, ready to differentiate an ash from a maple from an oak. Turns out they are remarkably different. There are over 170 species of tree in the park! So much for my guess of a dozen or more.

Today's in vivo teaching was taking place on the same trail I had wandered down in August with my husband. Under the chilly sunshine peeking through the ceiling of green and yellow Ranger Matt stopped us at a spot and charged us with identifying a type of maple. Heavens, there were so many types of maple. The tree finder booklet didn't fail me, though. The vertically split bark, the deep notches in the leaf and the white downy under surface made it a silver maple. While I was proud to get it right I was at the same time aware of how easily one could get it wrong. What a science.

While we were gathered Matt talked about another maple, the red maple. He described the ways the red maple exemplifies versatility. It seems it can grow just about anywhere. He pointed out two different red maples in our view. One close to the trail was tall and crowded close to several companions. All of them had fairly straight trunks and each sprouted a crown of leaves at the very top. Off in a relatively open spot was a red maple resplendent with a glorious bowl of dense leaves, providing shade underneath for several feet. Ma explained how trees adapt their shape to their surroundings. They allow room for each other. Or they adapt as much as they can so that the other survives. To show this, Ranger Amy led us a little further down the trail and pointed to a pair of trees which had sprouted close together and had grown around each other. The limbs of the thicker one had grown out of the way of the branches of the thinner tree so that there was space for each to grow and thrive. The shape of an individual tree is dependent on its immediate environment.

We looked up and examined the limb structure in a group of tall oaks. I had never looked closely at the arrangement of the thick limbs making up the crown. Amy pointed out that the limbs grow outward towards each other but branch growth stops at the tips of the neighbor's branch. Then the branches put further growth towards thickening the limb structure, essential in maintaining a strong crown. The cooperation is in keeping with the networking of the ecosystem of the forest. No sense abusing your neighbor.

Amy went on to describe the root system of trees in a forest. A tree's roots spread out far beyond the trunk and are in close contact with the roots of the neighboring trees. The root plate is visible at the base of the tree and is important as a moisture catcher. But below ground and for many feet the roots spread and continue to grow over time. Most importantly, they connect and communicate with the root systems of fellow trees. I had once read that some researchers go so far as to call the root system the "brain" of the tree.

How is a root system a "brain"? It seems there is a chemical and electrical signaling system in the roots that allows trees to share nutrients, communicate threat and danger, and serve as a kind of support system. In order to be an effective communicator, the tree must have a way of storing experience towards passing along accurate information.

“Look out! Dangerous fungi getting close!” Or “Insect invaders in the neighborhood. Go defensive.” The roots know. And through root network, chemical as well as electrical pulse signals are sent.

Trees know when their neighbors are sick or dying, presumably through a two-way network of electrical and chemical communication. Healthy trees will pump nutrients to their sick comrades through the roots. I thought about a tree giving up food for another. I wondered whatever happened to survival of the fittest. Apparently, I had something very wrong.

So, the life of a tree is one of social interdependence with its fellow trees and plants. Arborists know that the death of one tree in a group puts the others at risk if their roots have been tightly woven together. I recalled losing a willow in my back yard one year. It stopped sprouting leaves not long after I had a nearby pesky walnut removed. Never occurred to me they were friends.

We walked on. A family of French speakers passed us, their teenage son balancing precariously on a hoverboard. The rangers looked at each other and frowned, then shrugged. We walked over a low lying wooden bridge that spanned some wet land dotted with lacy ferns. On the other side we stopped and Matt talked with us about a huge felled tree on the west side of the trail. Its roots were visible.

“Still growing.” He announced after looking closely at the stiff tentacles living in the open air.

Since the tree roots are the lifeblood of the tree it can live a long time, collecting water from rainfall that soaks into the exposed roots. In the meantime, its trunk and limbs become home base to salamanders, squirrels, rabbits, snakes and more.

Apparently, death is good for the forest.

Matt pointed to a cavity in the trunk which was likely home to some lucky animal. He also pointed out the large patch of dark grey mushrooms growing along part of the thick trunk. The mushrooms prompted him to explain the relationship between fungi and tree roots.

“Wood wide web” is what some have called the intricate and expansive network of fungi that partners with tree roots under the forest floor. The symbiotic relationship is a lovely marriage which benefits the fungi which depends on the tree for sugar and carbohydrates. In return, the fungi offer the health-giving services of filtering out toxins at the root tips and also warding off intruders like bacteria or other, destructive fungi.

But the primary advantage offered by the fungi lies in the way its cottony web attaches to the root system and extends the reach for water and nutrients of its host tree.

With all this talk of interconnectedness I wondered about trees that were relatively alone. I chatted with Amy about this as the group strolled forward, passing an ancient wall of oblong rock that a volcano had spewed out millions of years ago. Amy said that tree “loners” did not do so well. Hermits that do not communicate with other trees via the chemical messaging among roots know less about what is going on around them. They do receive some signals about threats afoot, such as invading insects, droughts and the like, but they do not send signals on to others. There is some thinking that this isolation can be picked up by predators like insects or fungi and this makes them a target and vulnerable then to disease.

We were coming to the end of our hike and the end of our seminar. The air was cooling rapidly, and I buttoned my jacket up to my neck. Matt stopped us to look at a small Chestnut tree growing with some of its kind. He reminded us of the Chestnut blight of the early 20th century which decimated the Eastern forest of almost all Chestnut trees. Travelers brought the blight fungi from some distant continent to New England, and it traveled lightning fast from Maine to Georgia. It killed one of every four trees which is what the populous chestnut represented. Chestnuts still sprout and grow but never beyond a few years, felled by the cankerous fungus for which there was and is no remedy. The Chestnuts before us would be dying before long.

A woman standing close to Matt spoke up, her voice tinged with annoyance.

“That’s just hard to fathom. In this day and age, no way to stop a disease that some carelessness brought to the trees.”

Matt looked pensive as he moved closer to an oak which had a large oval indentation at eye level.

“Well, yes. But this has been going on since the beginning of—well, life, I guess. Look at this oak scar.”

We gathered close. Matt explained that the tree had sustained a wound to its bark at some point.

Amy added, “Somebody probably thought it would be fun to carve a message or came along and ran into the trees with a bike, some accident maybe.”

She showed us how the tree grows bark to close up the wound leaving a ridge-type of scar.

How was it I had been thinking of bark as dead? And trees as passive?

Matt went back to the lady's question about a cure for blight.

“Human carelessness is a problem. But really, the population of the forest is the real issue.”

Matt explained the importance of diversity to the health of the forest. A large variety of species is a protection against the devastating effects of the loss of any single one. Further, the loss of a species that is favored by other life often means loss for those beings as well. When the American Chestnut began to disappear, it took with it abundant crops of large nutritious nuts which wildlife had been dependent upon for thousands of years. The blight brought a decline in populations of black bear, gray squirrel, raccoon, wild turkey and more. Amy explained that other tree varieties began to fill the spots left vacant by dying chestnuts, red maple, red oak and hemlock in particular. The vacancy in the overhead canopy created by the death of the chestnut allowed sunshine to pour in on the smaller neighbors who shot up and prospered.

“But the large chestnut with all its sweetness and sugar is not really compensated by the smaller acorns that you see all around.” She picked up a thimble sized nut and held it up.

“And people who actually made a living of gathering and selling chestnuts and they used the timber for lumber enterprises. They lost income and food sources at the same time.”

I thought about the relationship between humans and trees. We use forest products in so many ways but at baseline humans are dependent on trees for the oxygen that trees exhale and circulate. And in return people exhale carbon dioxide which trees need for their life processes including photosynthesis for growth. The human/forest interdependence is age old and important. And still, humans are without question the single most dangerous predator of trees, mowing down untold acres of forest every year. I inwardly winced as I thought back on my decisions to have the backyard walnut cut down.

It was time to go. But one more lesson. At the end of the trail Amy picked up something that looked like a small brown nut. We gathered around her as she held it out in her hand.

“This is an oak gall. Who knows about galls?” Nobody did.

“Well, this is an ingenious little symbiosis where the insect larva takes up residence in the oak leaf. Somehow the leaf forms tissue around the larva creating a kind of casing where it can develop in safety. Eventually the round casing falls off the leaf and lives on the forest floor for a time. The larva feeds on its home from within until it develops into an insect which then eats its way out into the world.”

One man wondered out loud. “Why would the oak leaf want any part of that scheme?”

Amy laughed and shrugged. “Good question. There is so much we don’t know. But you know, it doesn’t harm the oak tree at all. Some insects quickly destroy leaves. This gall is pretty cooperative.”

I thanked the rangers for the learning of the day. As I steered down the mountain, I found myself noticing the subtle change in roadside vegetation with falling elevation. The cheerful golden coreopsis thickened as we lost a little altitude. This was new for me, to observe the effect of a small change in environment. I had learned this from an offhand comment from Ranger Matt. He had pointed to the abundance of fern in the understory but its absence as we headed up trail just a few hundred yards. I would never have put those details together on my own.

Exiting the park and as we sped along the highway towards town my friend and I talked about the seminar. Something was bothering me.

“Trees that are loners.”

“Yeah?”

“Why be a loner? If it’s not a good thing—“

My friend was quiet, mulling this over.

“Well, I guess trees don’t have a lot of choice where they sprout.”

Then she laughed, “But who does?”

I remembered a field trip from elementary school days. I must have been in the fourth grade. We went to a state park and noisily tromped through a forest, thrilled to be outdoors in the warm spring air. We had assignments and my group was supposed to find whirligigs. It was easy. There were piles of the v shaped winged seeds in several places and even as we searched there were a few “helicopters” drifting through the air.

Such seed abundance and yet so few saplings to show for it. I could almost hear Matt's voice explaining carefully about the soil and the sunlight and the moisture. The various conditions that would allow one tiny seed to become a towering king. And the quality of the neighborhood, of course.

A car was on my bumper. The traffic was picking up. Already I missed the fragrant air and the slower beat. But I knew I would be back to the forest soon. I would enjoy using the tree finder guide. Knowing about individual trees is interesting. Challenging. But mostly, I would be looking for the visual cues of forest reciprocity and friendship. Gleaning what I could from the subtle, intricate, and stunning ways that nature reveals her secrets to us. All, actually, in plain sight.

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