Wild Wednesday. 19 December 2021. Manzanita by Walt Anderson

This Wild Wednesday is wild enough to ignore the day of the week, and it comes to you in celebration of the healing, inspiring power of nature, so important as we deal with some pretty serious earthly challenges that affect humanity.

Red and green are popular colors for the holiday season, sometimes called the Holly Days. Manzanitas provide welcome brightness in the Southwest on dreary days, and they have fascinating life cycles. California has 50 species of manzanitas, pretty amazing in its own right, but my stories today will focus on two common manzanitas in Arizona: Pointleaf and Pringle. So let's mind our P's and take our cues from Mother Nature. It's time for a little manzanita merriment!

Manzanitas are prominent elements of chaparral, those brushy associations that often are so dense that to ride through them, a cowboy needs protective chaps. And maybe chapstick. They also occur as understory shrubs in oak and pine woodlands. Sinuous branches curve this way and that, as graceful as slender vegetative dancers.

Pointleaf Manzanita provides early flowers, typically from January into early April, but you may find some flowers in any month. Pringle Manzanita, usually at somewhat higher, moister sites, blooms later, typically April to June. Members of the heather family (Ericaceae), manzanitas have drooping bell-shaped corolla tubes with small openings at the bottom. We call these bell bottoms.

Anna's Hummingbirds often winter in parts of Arizona, especially if subsidized by hummingbird feeders. I have often assumed that early-flowering manzanitas are an important energy source for overwintering hummers, and it's true, but not exactly as I assumed. The tiny flowers have minute amounts of nectar, which is not easily extracted by a hummer. Instead, the birds appear to be feeding on thrips, tiny insects living in the bells, and their bills often damage the delicate flowers.

Flowers are visited by a diverse suite of insects, some of them active pollinators (like *Osmia ribiflorus*, the Blueberry Bee, with its scintillating blue-green metallic colors) and some of them exploiters that only occasionally facilitate pollination. Often you can see a narrow slit in the floral tube, a place where a robber has gone in directly for the nectar, bypassing the stamens and stigma where pollination would occur. Other species may come along and take advantage of the slits made by primary robbers. And there can be nectar thieves that force their way into unopened flowers before pollen has yet matured enough to be viable. Still, without insects to transport pollen between plants, there would be no seeds produced, as the flowers are self-incompatible. It amazes me that a cluster of manzanita bells is really a complex ecosystem with many players involved.

“Manzanita” means “little apple,” and here you can see fruits developing, each one a product of a successful pollination event.

As the fruits mature, they brighten and attract animals like raccoons, ringtails, javelinas, deer, foxes, coyotes, humans, and a variety of birds to partake of their nutrient-rich flesh.

The seeds usually pass through the animal's gut unharmed and enter the seed pool in the soil, where they wait for the magic kiss of fire to stir them to germinating life.

Chaparral is a fire-adapted ecosystem. It's always a matter of when, not if, it will burn (hence a fuelish place to build a house). A few months after a fire, sprouting species like Interior Scrub Oak are reviving from basal burls buried in the soil. Manzanitas have all been killed by the intensity of the heat and flames. However, the heat and perhaps leachate from the ash are the triggers for manzanita germination. Seeds that may have lain dormant for decades now sprout and poke their little shrubby heads above ground. Manzanitas are known as obligate seeders; they don't resprout the way oaks and mountain mahogany shrubs do. It can take four or five years of growth before they produce seeds, however, so if the fire-return interval is less than that, you can lose manzanitas from the system, which will then be taken over by the sprouting species. It's like Sprouts replacing Fry's.

Chaparral is intensely fire-prone. Because controlled burns next to human development can have undesirable side effects (like too much smoke for human health and comfort or, in a worse-case scenario, runaway flames that take houses as well as shrubs), fire managers may go into chaparral with massive machines that chew up and spit out shrub fragments. They call this mastication (something for you to chew upon!). But notice that unlike fire, which kills manzanitas, mastication can allow manzanitas to resprout. At best, this is a temporary solution to fire hazard in a developed area.

Fire has been a part of most western ecosystems for millennia, and fire suppression (thanks, Smoky the Bear!) has created landscapes where wildfire on massive scale can now occur. This is certainly exacerbated by climate change, as we have witnessed with increasingly damaging wildfires in recent years. Ironically, we have not dedicated enough resources to manage our landscapes on scales that will protect human life and property. Think Paradise Lost!

Freakish weather events like the 11 July 2021 hailstorm in the Granite Dells add to the ecosystem changes we must contend with. That storm stripped all the leaves from the manzanitas, oaks, and pinyons, and there has only been partial recovery, despite unusually generous monsoon rains that followed. Unlike fire, which triggers seed germination, the defoliation from the pounding hail has put tremendous strain on the living manzanitas. Will they have enough energy and longevity to produce the next seed crop, and even if they do, will there be fire that brings the seeds to life? We'll see.

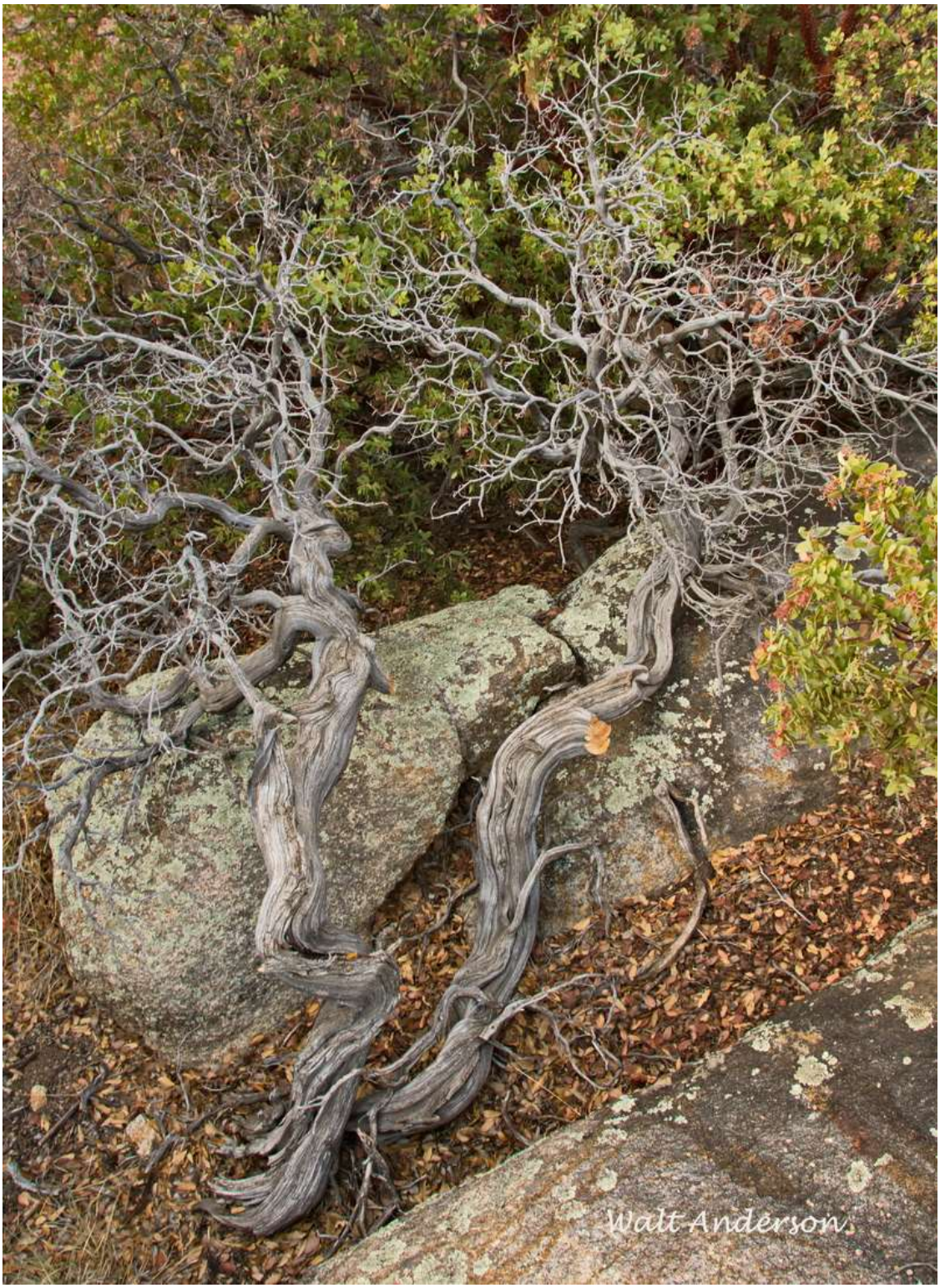
This fall, on manzanitas that had regrown foliage, I discovered some bizarre red shapes on many of the leaves. These parasitic growths are fold galls of the Manzanita Leaf Gall Aphid (*Tamalia coweni*). I wondered if the stresses of having to regrow leaves after the hail defoliation may have given the parasites an upper hand against the weakened plant, and that's possible, but I discovered that the life cycle of these gall-forming aphids is quite complex. These structures are created when a fundatrix (stem mother) aphid uses her stylish stylet to sting a row of cells in the leaf; her saliva contains an acid that mimics a growth hormone, or auxin, and induces growth such that the leaf swells and folds over her. She (and possibly one or more other mothers) produces offspring galore, filling the chamber with more little female aphids, all without the genetic help of any males.

Winged females emerge from those fold galls and fly to developing inflorescences (see the dangling pinkish clusters of future flowers amidst the red galls above). New galls are created by wingless females; they then produce offspring that are both male and female (yes, it's possible in insects!), and these mate and deposit eggs in cracks in the bark at the bases of manzanita shrubs, where they overwinter. Then a new generation of fundatrices takes over in the spring. Wow—three generations per year, two of them without any males! Such gall!

Manzanitas have some additional survival adaptations up their woody sleeves. Bushes tend to sprawl outward, and where stems come into contact with the soil, they can set down adventitious roots in a cloning process called layering. Then as nutrients get used up where the original plant stood, the newer branches can continue to expand outward, creating “fairy rings” of live plants around the corpse of the original founder. The satellite plants may become disconnected from the others, but they are all genetically identical. Each separate plant is called a ramet, and the whole group of identical plants is called a genet. Now there are a couple new words for your Scrabble game or crossword puzzle!

When you or I lose a limb, it's a big deal. We only have four to work with! But when drought or overshading or some other strain compromises a manzanita limb, the plant lets it go, sacrificing parts to save the whole. This results in "striping," where living bark connects the photosynthetically active foliage with the working roots in the ground, leaving stripes of dead wood to mark where once a living branch existed. These shrubs truly earn their stripes.

Manzanita leaves are tough, waxy, stiff—all traits similar to those of the sclerophyllous leaves of other drought-adapted chaparral plants. Those traits, however, slow the photosynthetic process compared to that of a water-spending leaf of a cottonwood in summer. But watch a manzanita (or its heath relative, the madrone) through the year, and you can spot it shedding bark, revealing green tissue beneath. Like the green-barked palo verde (but a bit less obvious about it), a manzanita is stem-photosynthetic, able to produce sugars through its bark, as well as its miserly leaves. The outer red bark serves as a sunscreen, but it lets some light through to allow some photosynthesis year-round. Shedding the bark annually keeps lichens from covering the photosynthetic surface. Compare that to the lichen- and moss-covered bark of an oak, which doesn't shed.



By now, you have surely concluded that I am fascinated by manzanitas, both for their inherent beauty and also for their associated biological connections and amazing adaptations. If you happen to have a Christmas tree in your celebration of the season, I urge you also to get out in nature and connect with an impressive Christmas shrub, such as the manzanita. Happy Holidays!