

## They All Got the Memo

Suddenly. Yes, suddenly, my world turned yellow. The day before that was not the color of my world. There was no dominant theme from the color wheel. The sky was mostly blue, the earth was an earth tone. A red-brown and sometimes beige hue. The vegetation was spindly sticks with hints of green returning. Just a suggestion that leaves were awakening from their winter hibernation. And then today, my world turned yellow.

That is the fault of those green sticks. I know about sticks. I'm from Louisiana and the state capitol is Red Stick. They used French and made it Baton Rouge to class that up a bit. In Arizona, my adopted state, we have green sticks. That's the state tree. But to gussy it up a bit, we use Spanish and it's the Palo Verde. And when they blossom, the yellow bursts onto the scene suddenly. And not just a tree here or there. All of the Palo Verde trees got the memo. They are as much in unison as Robert Shaw's Corral singing the Hallelujah Chorus.

How does that happen? Who sent the memo, how do trees read memos, and how do they get in sync?

We can invoke Mother Nature as the orchestra leader if we want to be whimsical. We know she's right on the shelf next to the Easter Bunny and the Tooth Fairy. I guess we can add the Elf on the Shelf, but he's more real.

Consider for a moment how incrementally daylight changes as we move from winter into spring. We don't have big leaps of daylight suddenly increasing by an hour or even by half an hour. We get a few minutes more of daylight each day. The difference is almost unnoticed from one day to the next, but if you are paying close attention, you might notice a difference from week to week. Maybe.

Next, consider how the temperature fluctuates in springtime. Cold mornings are not uncommon even though winter has passed. Warm days are sometimes only warm afternoons. The temperature swings are erratic. Could you set your schedule to start wearing Bermuda shorts when the temperature hits 85 degrees F. What if a cold front comes through the very next day? Would you set your wardrobe to a point on the thermometer? You'd probably want to have a series of days that were warm and maybe even then you wouldn't commit to shorts.

The reason for considering the amount of daylight and the temperature is the Memo. We humans are not able to read the language in which the Memo is distributed. And the distribution system is every bit as sophisticated as the cell phone alert system that causes all the cell phones in a room to suddenly blare warning signals indicating that severe weather is approaching, or a silver alert has been issued because another senior citizen has gone over the wall and is on the roam. Synchronicity. The Palo Verdes have it and had it long before Verizon, T-Mobile, or AT&T.

Botany teaches us that warming temperatures and increasing daylight cause the things we associate with springtime. Dried-up sticks turn green with small, and then larger leaves. We glibly accept that. That is why I asked you to consider the temperature at which you would put on Bermuda shorts. Springtime temperatures fluctuate widely. Which number was the Powerball that caused the leaves to start growing? I know there are times when a freak snowfall will hit just after the leaves have deemed it safe to return to their limbs. But usually, that's uncommon. I live near a grove of 6000 acres of pecan trees. They all start leafing at about the same time. Within a day or two of each other. Was there a combination of temperature numbers that had to be hit in just the right sequence and then all the pecan trees exhale green leaves? A Powerball winner.

Botany tells us that the amount of daylight is critical for these springtime events. It is perfectly obvious that daylight increases dramatically in the spring. That makes it easy to just blithely accept the notion that sunlight somehow told the trees to do their thing. Consider just how finely tuned this plant solar meter must be set. It can sense those incremental day-to-day changes that we humans can only note with instrumentation. We check our clocks and note the time of sunrise and sunset. Sure enough, there are a few minutes of change from day to day. But can you sense anything different between yesterday and today? Without consulting your watch? Yesterday, the Palo Verdes were green sticks with very small green leaves. Today you can't see the green and a dome of yellow has engulfed the entire tree. The tree got the Memo. And not just one tree. Every Palo Verde in Green Valley, Arizona, turned yellow on the same day. Some Memo. Trees that don't have eyes to see the sunlight, or read a watch, or mouths to talk to each other. They got the Memo that said to execute plan A. And they all obeyed.

Botanical science can tell us more about how the Memo works. The right amount of sunlight on the leaf triggers some leaf RNA to encode Florigen. Three genes are involved. Flowering Locus T is another name for Florigen. This magic substance leaves the leaf of origin and travels to the tip of the stem where there is an apical bud just waiting to be told: Am I going to be a leaf or a flower? It's sort of like the big reveal at a baby shower. Boy or Girl. Leaf or Flower. The Florigen will dictate that instead of being a leaf, it is time to flower and bingo. We have lift-off. We have yellow. An explosion of yellow. On the tip of every viable branch. And this RNA message was sent at the same time to all the tips of all the Palo Verde branches in Green Valley, Arizona. A Hallelujah Chorus of yellow. Let's see the Tooth Fairy top this act. Not even the Easter Bunny can come close.

The biological clock inside a tree can average out temperatures better than we can and know when to alter their behavior. They can read the sun with more precision than we can. And they can act in unison far better than humans can. We can't even read the Memo.

Submitted by Bob Rietschel, April 2, 2023

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