



Oh, how I treasure this time of year! We've harvested our vegetables and our flowers are spent. The warm-weather weeds are gone, and the cold-weather weeds have not yet germinated. Now is the time to sit back and muse on how marvelous nature can be! Here are a few of mine.

- Greater Roadrunners live in the Flagstaff region, and being poor flyers and not persnickety when it comes to food, they remain here through winter. They do so by occupying massive territories, where they find a large selection of edible foods like rodents, lizards, snakes, insects, and spiders. Moreover, about 10% of their cold-weather diet consists of fruits, seeds, and vegetation. One December, I spied a roadrunner perched on my wooden fence, facing away from the sun. Its wings were slightly spread apart, exposing an undercoat of black feathers. These birds do this frequently on cold days as an efficient means to radiate heat into their bodies.
- While a great number of butterfly species, like monarchs, migrate to warmer climates to overwinter, some species hunker down as caterpillars or in chrysalises (pupae) in rock crevices, holes in trees, or leaf litter. Some overwinter as eggs on leaves or twigs. Until recently, I have wondered why Mourning Cloaks are often the first adult butterflies flitting around my garden at the onset of spring. I know now that these beauties, garbed in deep maroon-brown wings bordered with blue dots and a tan fringe,

find refuge right here in Northern Arizona. Overwintering butterflies enter into a type of hibernation called torpor, when their body temperature may drop below zero. This is due to a chemical similar to antifreeze, called glycerol, that the insects start harboring in their hemolymph (body fluids) in autumn.

- When a hummingbird isn't feeding, it retracts its 1.5-inch tongue and stretches it around its skull--how's that for space-saving efficiency? Woodpecker tongues do the same with an added purpose—to cushion their brains as they hammer trees searching for cloistered insects.
- If you plant sequoia seeds, there's a decent chance that a few will germinate and thrive. Yes, here in the Flagstaff region! My next-door neighbor has three approximately ten-foot-tall, gorgeous, pyramidal specimens on his property. About 12 years ago, he ordered 30 miniscule sequoia seeds on the internet. Following directions to the letter, he gave the seeds a three-month cold treatment, planted them in small pots, and as the seedlings grew, he transferred them to larger pots. While some of them perished, he eventually gave the viable seedlings their permanent homes in a sunny location, spaced far apart. If you wish to have your own sequoia trees, be sure you have a huge sunny or partially-sunny site that may be reached with an irrigation hose, as sequoias are thirsty trees native to the foggy western slopes of the Sierra Nevada in California.
- The oldest and heaviest living thing on earth may be a Quaking Aspen grove, dubbed Pando, in Fishlake National Forest in Utah. This is because, like most Aspen groves, each tree originated from one tree whose rhizomes (specialized roots) sprouted new "individual" but genetically-identical trees. Pando's original tree lived about 80,000 years ago. Its cloned trees share a common root system and presently span more than 100 acres!
- In the southwest, Banana yuccas (*Yucca baccata*) and nocturnal Yucca moths of the genus *Tegeticula* have a relationship where both species benefit. The yucca relies on the moth for pollination, whereby the insect brings pollen from the flower of one yucca plant to the flower of another yucca plant. (Pollination, a method of sexual reproduction in which genes of two organisms are mixed, increases diversity and longevity.) In turn, the moth caterpillars rely on yucca seeds for sustenance. Here's how it's done: The female moth employs specialized maxillary palps to collect pollen from the first yucca flower and flies to the second, where she oviposits her eggs in its ovary. She then deposits the collected pollen onto the same flower's stigma, kicking off the process of pollination. When the caterpillars hatch, they feed on the developing seeds. The flower produces an overabundance of seeds, ensuring that some seeds will be viable and later dispersed by animals like the desert woodrat—yet another example of mutualism!

In the coming months, I hope all of us can occasionally pause and gently muse about the marvels of nature. It can be both relaxing and riveting!

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