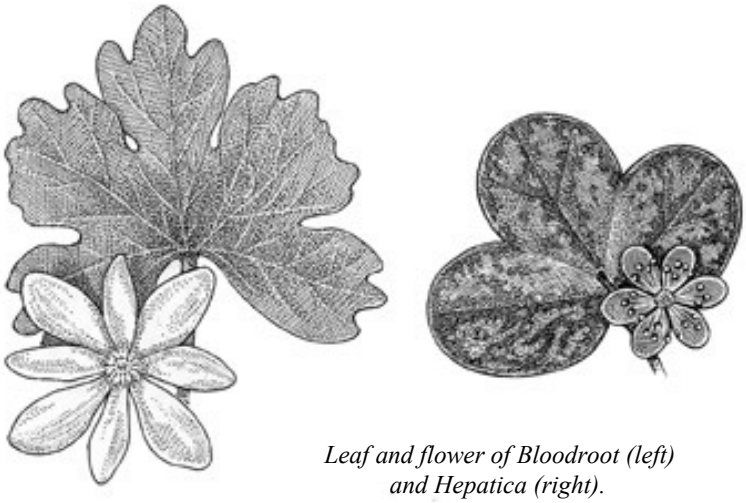
Local Nature

by Eric Dinerstein

Ants in Our Plants

Henry David Thoreau, perhaps America's most gifted chronicler of the seasons, was said to be able to pinpoint the day of the year by the emergence of a wildflower or some other woodland event—thereby creating his own natural calendar. In his journal entry on April 21st, 1861, he noted, "very handsome tufts of Hepatica triloba at Melrose, and the bloodroot out also there." In Cabin John, we are far enough south of Thoreau's Walden Pond to find blooming bloodroot and Hepatica right about now, in the first days of Spring. And it is well worth the effort to go search them for the few days that the fragile blooms last.



Leaf and flower of Bloodroot (left) and Hepatica (right).

Among the most elegant of wildflowers, Bloodroot sends up a flowering stalk holding a white flower with eight long petals surrounded by a single odd-shaped leaf that unfolds like a webbed foot. Hepatica flowers, in contrast, are a shade of blue so rich and vibrant that they defy our English-language ability to come up with an adequate descriptor. Lying somewhere on the painter's palette between periwinkle and hyacinth, Hepatica's vibrant blossoms are among the most anticipated sightings in spring.

Bloodroot and Hepatica are unrelated: the first is in the poppy family and the second in the buttercup family, but they have a lot else in common. Both are reputed to have important healing properties. Bloodroot was used as medicine and dyes by Native Americans; the unusual reddish-orange sap that oozes out of the cut leaf or stem seems fitting for a family whose distillations give us opium, morphine, and heroin. Hepatica triloba, so named because the prostrate leaves and their three lobes resemble the liver in shape and sometimes in color, was once used to treat ailments associated with this vital organ.

Both species attract cold-hardy flies and bees to spread their pollen about—nothing too original here. But the mode in which these plants spread their seeds around, or what scientists term seed dispersal, rises to the height of evolutionary drama and demands that we bend down in awe to witness one of the great marvels of the natural world—animal-plant mutualisms. The term applies to close relationships in which animals and plants co-evolve to provide benefits that increase the fitness of the other partner. In this case, our two delicate wildflower species rely on one of the most dogged, reliable, and abundant dispersal agents—ants that survive the winter in our woods. Attached to both bloodroot and Hepatica seeds is a minute fleshy tissue—called an elaiosome, or 'oily body' in Greek— whose fat and protein draw in the ants. The ants carry off the ripe seeds to their underground colonies where the tissue is eaten and the ballast—the seed—is deposited, unharmed in what amounts to an ant compost pile. The seeds germinate in a safe, nutrient-rich spot, and as important, far from the parent where there is less chance of competition for light and nutrients with other infant bloodroot and Hepatica seedlings. Some studies show that the foraging ants may offer further benefits by lubricating the seeds brought into the nest with anti-microbial fluids from specialized glands they possess, reducing the chances that the seeds will be attacked and killed by fungi.

As astute a naturalist as Thoreau was, there is nothing in his journals that indicates he detected seed dispersal by ants. He wrote about seed dispersal by squirrels and birds but ants seemed to have escaped his close gaze, just as they did most early naturalists. Then, 36 years after Thoreau's journal entry, in 1897, Charles Robertson discovered ant dispersal of bloodroot. For some unknown reason, however, little was written about seed dispersal by ants in the scientific

literature until 1940 when Burton Gates reported ants carrying the seeds of large flowered Trillium. The 19th century naturalists' oversight is even more striking because so many of the early spring wildflowers in the Eastern U.S. rely on ants to move seeds: trout lilies (which cover the hillsides bordering Cabin John Creek for a solid week), wild bleeding hearts, many species of trillium, wild ginger, almost all violets, spring beauty, and Corydalis. The most beautiful of all ant-dispersed plants grows in dense colonies on nearby Plummers Island—twinleaf, the wildflower named after our third President (Jeffersonia). In early Spring, there is relatively little food around for the ants to gather to take back to their nests so the lipid and protein-rich packets of these species are highly sought after. Once summer arises there is plenty of food so the plants that flower and fruit at this time rely upon other dispersers like birds and mammals and don't produce elaisosomes.

The phenomenon of ant-plant interactions extends far beyond Cabin John and Walden Pond. Worldwide, there are estimated to be between 11,000-25,000 species of plants spread among 55 different plant families that rely on ants to move seeds around. Mutualism of this kind is a case of convergent evolution, in which independently, plants as different as orchids and violets and wild ginger entice ants, each evolving or "converging" on a similar recipe for a tasty elaiosome to reward hungry ants in exchange for improved dispersal services. Ant-plants, as they are called, are particularly common in Australia and other habitats where fire is a common factor in shaping communities. The seeds of fire-adapted species would never survive the hot burns that scorch the earth above ground but, thanks to ants in their plants, these species have their seeds safely germinating in the ground below the flames.

Dispersal of our local early-flowering plants by neighboring ants is just one of the many examples of mutualisms that can be found in the Potomac wilderness—where nature offers us a model of how unrelated species can work for the benefit of each other.

Editor's Note: If you have any questions about local wildlife or ideas for future topics, you can contact Eric at ericdinerstein@gmail.com.

Letters to the Editor

Dear Mr. Dinerstein,

I had just finished re-reading your December article on woodpeckers when I looked out the window and was treated to a visit from a pair of pileated woodpeckers. What a thrill. I've never had one come to a feeder before!

© Warren Goodell

We're new to Cabin John this summer and have been really enjoying the wild life. I'm still waiting to see a sapsucker and have been disappointed not to have any Hairy Woodpeckers grace our feeders. Guess I'll just have to make do with the Pileated.

Thank you for sharing your expertise with the *Village News*. It has made a difference!

—Warren E. Goodell