

Seeing the Sourlands



Summer into Winter Part II; October by Jim Amon

I used to think that in early October the Sourland forest burst into color, with the crescendo, I thought, coming the week after Columbus Day. I am paying close attention this year and I was quite surprised when I walked into the forest on October 1st and saw that it looked a lot like it did on September 1st. It did not look like summer anymore but there was still no hint of a blaze of color. By October 8th there was only a little more color; it had started on the forest floor in September and by October 8th the change had progressed upward to the shrub and understory plants. The fruits on Spicebush and Blackhaw viburnum shrubs had ripened into bright colors. Another slight but noticeable change is that by the 15th the canopy seemed less dense, some leaves had dropped without changing color and more light was coming through. A few of the canopy trees began to show color, but the overwhelming majority were still green. The only canopy species that had made a really clear change was Black walnut, but that wasn't because of a change of color--the Walnuts had lost almost all of their leaves along with most of their nuts.

When I saw how little visible change had occurred in the forest between early September and mid-October I wondered if there were biological changes that I could not see but that never-the-less were the consequence of a forest getting ready for the long dormancy of winter. I tried various internet searches and found that the most

fruitful were in answer to the question, "Why do tree leaves change color in autumn?" I learned that chemical and physical changes were occurring in the trees that were not visible but were essential in the passage from summer to winter.

The leaves are green all summer because they contain green-pigmented chlorophyll. Chlorophyll is the essential element in photosynthesis--the miraculous process by which leaves turn air and sunlight into sugars that nourish the trees. The chlorophyll molecules in the leaves are continually broken down by the sunlight but the nutrients in the leaves re-supply chlorophyll, keeping the leaves green. When autumn starts and the days get shorter, chemical light receptors in the tree start to produce an abundance of cells in the leaves at the juncture of the leaf and twig and these cells clog the passageways between tree and leaf. As the chlorophyll in these now-isolated leaves is used it cannot be replaced and the yellow and orange colors that were in the leaf all along become visible. The blockage between tree and leaf also means that sugars manufactured in the leaf cannot pass into the tree. If sugars are stranded in the leaf the bright sunlight of autumn uses these sugars to produce red and purple colors.

The parade of autumnal color is triggered by the shortening days but temperature and rainfall also play a role. A pattern of plenty of moisture in the latter part of the growing season, along with bright days and cold nights in autumn speeds the destruction of chlorophyll--hence revealing the yellow and orange colors--and promotes the sugars in the leaves to produce the red and purple colors. If it is too dry during the growing season the timing of the changing colors can be put off for a couple of weeks. If it is exceptionally droughty the barrier between the leaves and their trees will develop early and the leaves will turn brown and drop. If there is a hard frost early in autumn it, too, will kill the leaves, causing them to turn brown and drop from the trees.

Different species of trees have their own autumnal patterns. Red oak leaves, for example, stay green longer than most of the other Sourland trees, then they turn a leathery reddish brown and stay on the tree well into November. The leaves on some tree species always turn yellow, others always turn red or orange. Trees in low areas respond on a slightly different schedule because they have more moisture than trees in upland habitats. Trees on edges get more sunlight than trees in forest interiors so that causes a difference. All of these individual differences result in an oriental carpet pattern that makes the forest so beautiful in the fall.