

Inspiring and Fostering Creative Learning and Expression Through the Lens of Digital Photography

Reflections

Impressions



48 Center Street, Suite 219—Chicopee, MA 01013—Phone: (413) 579-8885

reflectionsphotolearning.com

PhotoJournal Reflections

Spring 2019

PhotoJournal Reflections

Photosynthesis Photography

Young maple leaves showing their true colors - October Mountain State Forest - Lee, Massachusetts

As spring begins across southern New England, the landscapes appear greener as more leaves and vegetation develop with the start of the growing season. While the region is well known for its fall colors that draw tourists from far and wide each October, if you pay careful attention to the development of foliage during April, you might be able to see some of those colors during spring. They are much more subtle now though, than later in the year. New England's maple trees are especially colorful during the first few days that their leaves appear before the production of chlorophyll begins.

Chlorophyll is a green, chemical pigment that gives vegetation its characteristic color during the summer months. As you may be aware, during autumn, green plants stop producing chlorophyll in response to the shortening hours of daylight at that time of the year. With the chlorophyll no longer present, the true colors of the leaves—reds, oranges, and yellows that we typically associate with autumn leaves—become visible.

In the first few days that foliage appears on the area's deciduous trees each spring, especially in the young maple leaves that are known for their bright fall colors, careful observation will reveal some of those same colors. Once the conditions are right for the leaves to begin producing chlorophyll, they become greener. At that point, photosynthesis, a chemical reaction involving the chlorophyll (which absorbs energy from the Sun), along with carbon dioxide from the air and water, allows green plants to convert these ingredients to glucose. The glucose is then utilized by the plants as "food." A byproduct of this chemical reaction is oxygen. So, through photosynthesis, green plants remove carbon dioxide from the atmosphere, and replace it with oxygen that humans need to survive.

An interesting project could be conducted to photograph the changing appearance of the leaves of a tree, or trees, for several weeks during the spring. It would serve to visually document the appearance of the leaves and the approximate date when chlorophyll production first occurs. The Center for Northern Woodlands Education has an excellent article describing the colors that appear in the leaves during spring. The article also briefly describes how scientists have been conducting such observations in Vermont each year. But for young learners who enjoy learning about nature, and educators who are looking for a long-term, interdisciplinary science project, the return of green leaves to the local trees provide an excellent learning opportunity.

Many elementary school classrooms already monitor and record weather conditions each day, in some way. But few make any observations of the effects of weather conditions on the plants and animals that rely on relatively narrow ranges of conditions for their survival. Indeed, according to the Northern Woods article, the start of chlorophyll production by New England's deciduous trees and green plants can vary considerably from one year to the next and is especially dependent upon temperature. Daily weather conditions, observations of the local plants and trees, and the photographic record of even a single tree limb over time (with dates), could all be correlated with one another. A final summary of the project could also be produced, with follow-up questions for further investigation.

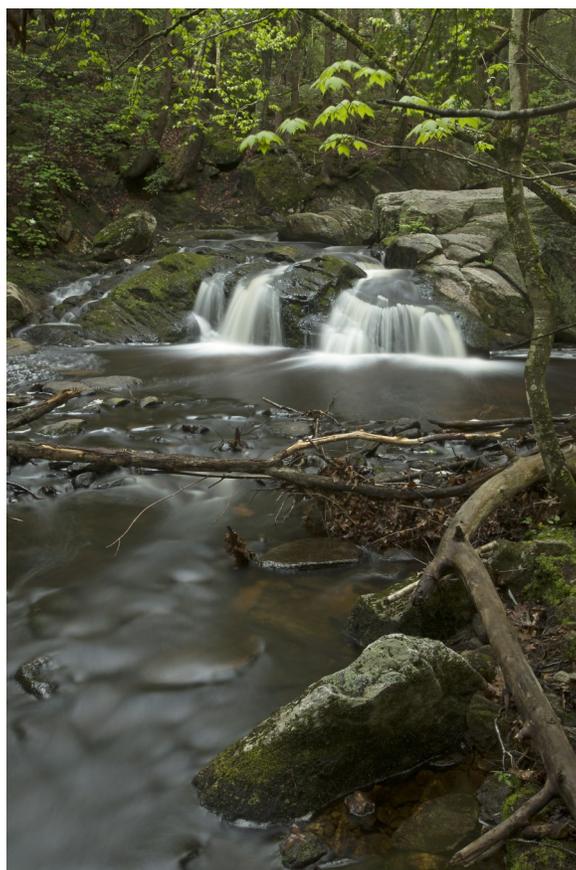
Along with the return of chlorophyll to the trees, many types of flowering plants are in full bloom during spring as well. It is an ideal time to observe noticeable changes in nature that take place in a matter of days or week, rather than over years. And, for those with young learners who can't seem to wait to be outdoors again, following a long winter, observing and photographing these changes is an ideal way to overcome the shorter attention spans that only increase as warmer spring weather begins.

To read more about the foliage colors that are visible during spring in New England, visit:

https://northernwoodlands.org/articles/article/why_do_leaves_in_spring_sometimes_appear_more_red_than_green

An overview of the process of photosynthesis can be found on the Smithsonian Science Education Center website:

<https://ssec.si.edu/stemvisions-blog/what-photosynthesis>.



Green maple leaves appear in this photograph of a waterfall at the Enders State Forest in Granby, CT. Once chlorophyll production begins, any subtle colors visible in the leaves soon after they form are replaced by the more familiar green that will remain prominent throughout the upcoming summer months.

Homeschool Learning Opportunities

Reflections and Impressions offers an introduction to digital photography and digital image processing that is a great way for families with homeschooled children to take advantage of the many learning opportunities that surround us here in western Massachusetts.

From the streams and rivers of the local watershed, to the rocks and minerals that make up the land of the Pioneer Valley and the Berkshires, and from the ever-changing weather to the majestic view of space that we can enjoy at night, Reflections and Impressions can help you and your homeschooled children extend your opportunities for meaningful and creative learning experiences.

See just how the world around us is the perfect classroom setting for exploring and documenting nature, while making connections to meet learning standards mandated by the Massachusetts Department and of Elementary and Secondary Education.

To learn more about R & I's programs, request additional information about them, and see the latest reflections and impressions collected from nature's never-ending story, visit <https://reflectionsphotolearning.com>.

Reflections and Impressions is now scheduling programs for families with homeschooled children for the 2019-20 school year!



The R & I Learning Center provides all the tools for you to learn about digital landscape and nature photography, and can inspire you to draw connections from photographic subjects to learning standards in science, math, and language arts.

Recent R & I Photo Journeys

The winter season of 2018-19 that just concluded presented many opportunities for photographing the land and sky. Below is just a sampling of some of the scenes from recent months that made for a memorable season. While winter weather was practically nonexistent across southern New England for most of December and through mid-January, the December night sky featured the appearance of an interesting celestial visitor. Then, the final weeks of January through much of February finally brought colder temperatures and snow to the region, before a final coastal winter storm on March 4th left a blanket of wet snow that made for a scenic, wintry landscape. It was a winter to remember, despite the season ending with below normal snow accumulations and above normal temperatures.



Above: Despite high clouds from an approaching storm, Comet Wirtanen could be seen near the winter constellation Orion (the comet is just above the trees on the right) on the evening of December 12, 2018. A bright meteor from the annual Geminid Meteor Shower also appeared momentarily. **Left:** Arctic air spilled southward into southern New England for a few days at the end of January, producing freezing fog and rime icing near local lakes and rivers for a few mornings. **Below:** A winter storm left a coating of wet snow along the Westfield River on the morning of March 4, 2019.



Curriculum Connections

From the Massachusetts Science and Technology/Engineering Learning Standards

LS1.C Organization for matter and energy flow in organisms - **Matter cycles between living and nonliving parts of an ecosystem. Plants use the energy from light to make sugars through photosynthesis. Within individual organisms, food is broken down through cellular respiration, which rearranges molecules and releases energy.**

MCAS (the Massachusetts Comprehensive Assessment System) season is upon us. Every spring, Massachusetts students at several grade levels are tested on specific learning standards developed by the Massachusetts Department of Elementary and Secondary Education. In addition to Mathematics and English Language Arts, students in Grades 5, 8, and 10-12 are also tested in the areas of Science and Technology/Engineering.



The MCAS is intended to test a student’s ability to demonstrate recognition, understanding, and mastery of specific learning standards, such as the learning standard related to photosynthesis above that is tested on the Grade 8 Science portion of the MCAS. A multiple-choice question about this specific learning standard appears on the Grade 8 Science MCAS in some form each year.

The Spring 2015 version of that test included a multiple choice question that presented students with a visual representation of a “natural process” involving sunlight, carbon dioxide, and water being converted to sugar and oxygen, in the form of a simplified chemical equation. The students were asked to identify which natural process was represented, with the four choices being decomposition, metamorphosis, photosynthesis, and respiration.

The question was designed to assess whether students could distinguish between the four choices presented. All four are natural processes, and all four are natural processes that students at this level should have learned about at some point between Grade 6 and the time at which they would have encountered this question in Grade 8. To answer it correctly, students would need to apply their knowledge and understanding of many different natural processes to identify which natural process among the four choices matched the simplified representation of photosynthesis they were presented with.

Decomposition involves organic matter but does not directly require sunlight to occur. Metamorphosis is the natural process through which certain living things, such as tadpoles, take a different physical form. A caterpillar becoming a moth or butterfly is another example of metamorphosis. Once again, sunlight is not directly required, either for the process to begin, or for the change to occur. Only one natural process from among these four requires sunlight in order to occur. Respiration is the process through which some living things obtain oxygen and release carbon dioxide (commonly referred to as breathing).

Inspiring and Fostering Creative Learning and Expression Through the Lens of Digital Photography

Reflections and Impressions

48 Center Street, Suite 219

Chicopee, MA 01013

(413) 579-8885

reflectionsphotolearning.com



- ◇ Educational Outreach Programs
- ◇ School and Group Presentations
- ◇ Curriculum Enrichment
- ◇ Digital Photography Instruction
- ◇ Motivation for Lifelong Learning



Remember to
Read, Reflect,
&
Impress!