



Colors of Fall

By Adrianna Gleaton



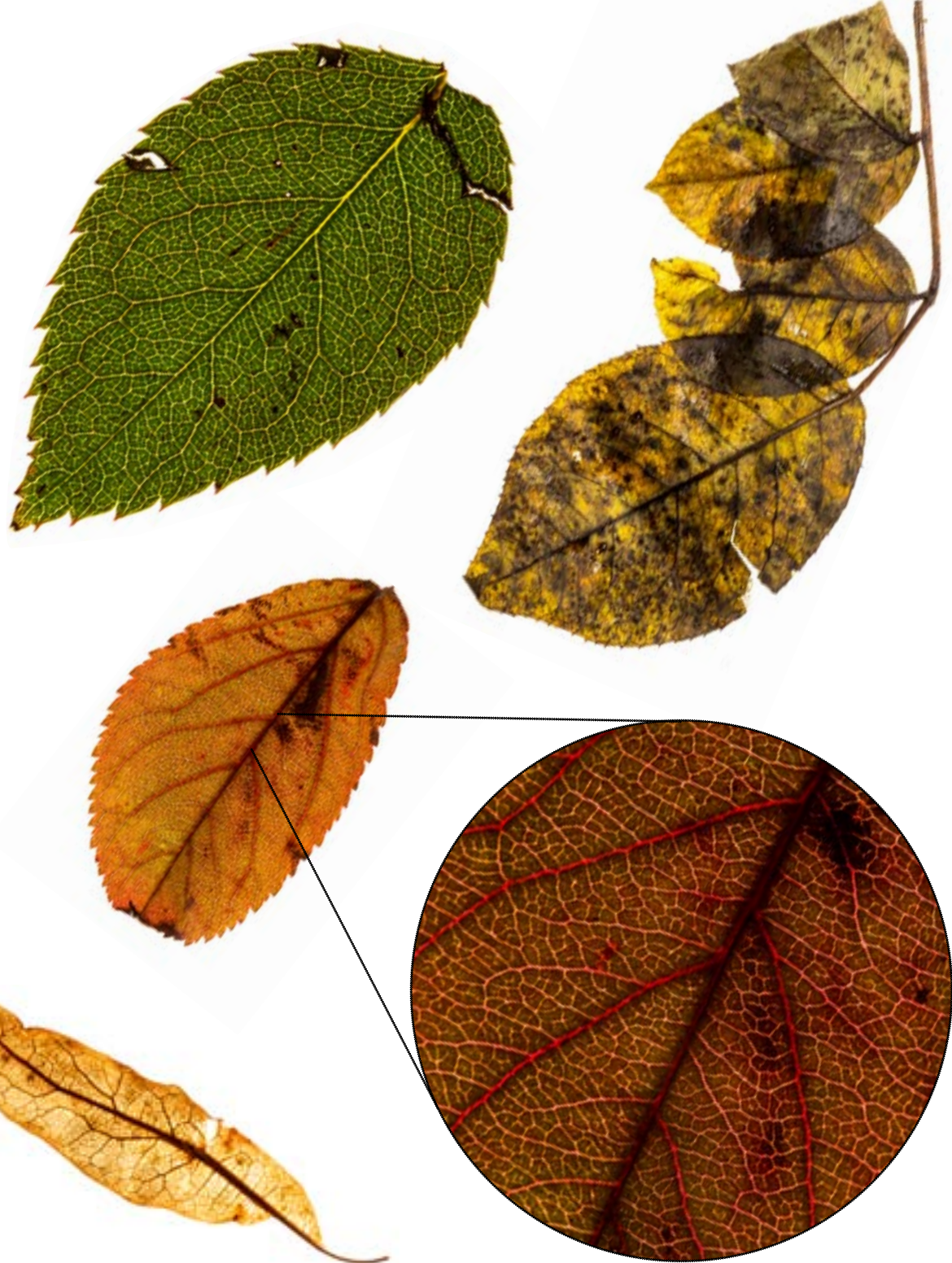
One of the most iconic symbols of fall is when the leaves atop many trees and plants start to change color. The rich reds, browns, yellows, oranges, and even purples attract much attention; transforming previously green scenery into a vibrant showcase of nature's splendor and beauty. Beginning in early September, the colorful show can last all the way into December depending on the weather conditions and location. These colors are so captivating, they even inspire people to drive around in search of the most beautiful displays. These 'leaf chasers' follow the peaks of color, as indicated by weather patterns, in order to catch areas of change at the perfect time.



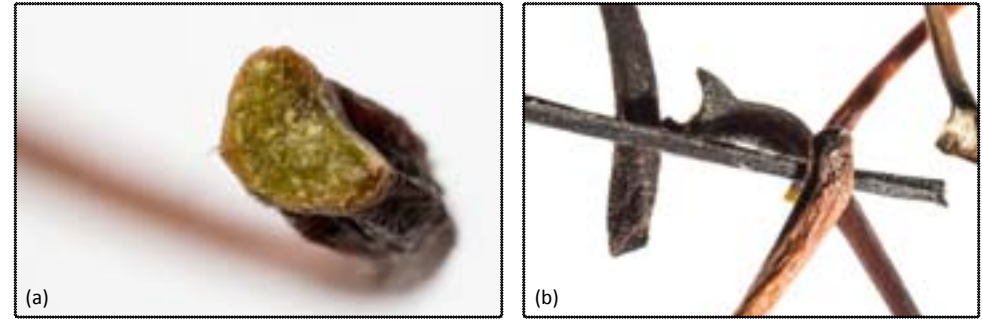
As fall approaches, the days get shorter and the temperatures begin to drop. With these changes, another transition begins. Leaves will halt their process of photosynthesis. Chlorophyll begins to break down, which in turn diminishes the green coloring. Allowing the other pigments, like the yellows and oranges from carotenes and xanthophyll to become visible. In addition to this change, other chemical shifts take place, such as phosphates and other chemicals moving from the leaves into the stems of the plant. This move alters the chemical breakdowns and is responsible

for the creation of anthocyanin pigments, a reddish color. The variance in colors that can be seen are due to the different combinations and varying degree of chlorophyll breakdown and other pigments within the leaves.

It is theorized that these colors are a method to protect the tree before the upcoming winter months. Insects will often seek refuge in trees for the cold snowy months. Some think it is possible that the colors are used to deter these insects that might be harmful to the tree.



Other chemical processes also take place during this time. A layer of cells is created which serves the special purpose of separating the leaf from the tree. This layer seals off the leaf stem from the tree, which allows wind or gravity to pull it the rest of the way off (a, b). Leaves release excess water through cuticles in their surface when photosynthesis takes place. Due to winters being colder and drier, the trees cannot obtain the water they need to replenish what would be lost. The trees must shed their leaves in order to survive. These types of trees that lose their leaves annually are called deciduous.



Above: Leaf stems that have been sealed to separate the leaves from the tree: (a) close up of seal, (b) seals of several different types of leaves

However, not all trees change color and shed their leaves. There is another category of trees, called evergreens, which maintain their green color year round. Evergreens have needles, which are actually regular leaves that are rolled up very tightly. They are covered in a wax, to help prevent water loss. These trees are mainly found in northern, colder climates. Climates where they are found have a much shorter growing season, which resulted in the adaptation that allows the trees to gather light all year round. Despite this adaptation, photosynthesis cannot take place in these colder months since snow and ice are not usable water forms. Evergreen trees store the light energy and remain dormant until the ice melts into a usable form of water again.

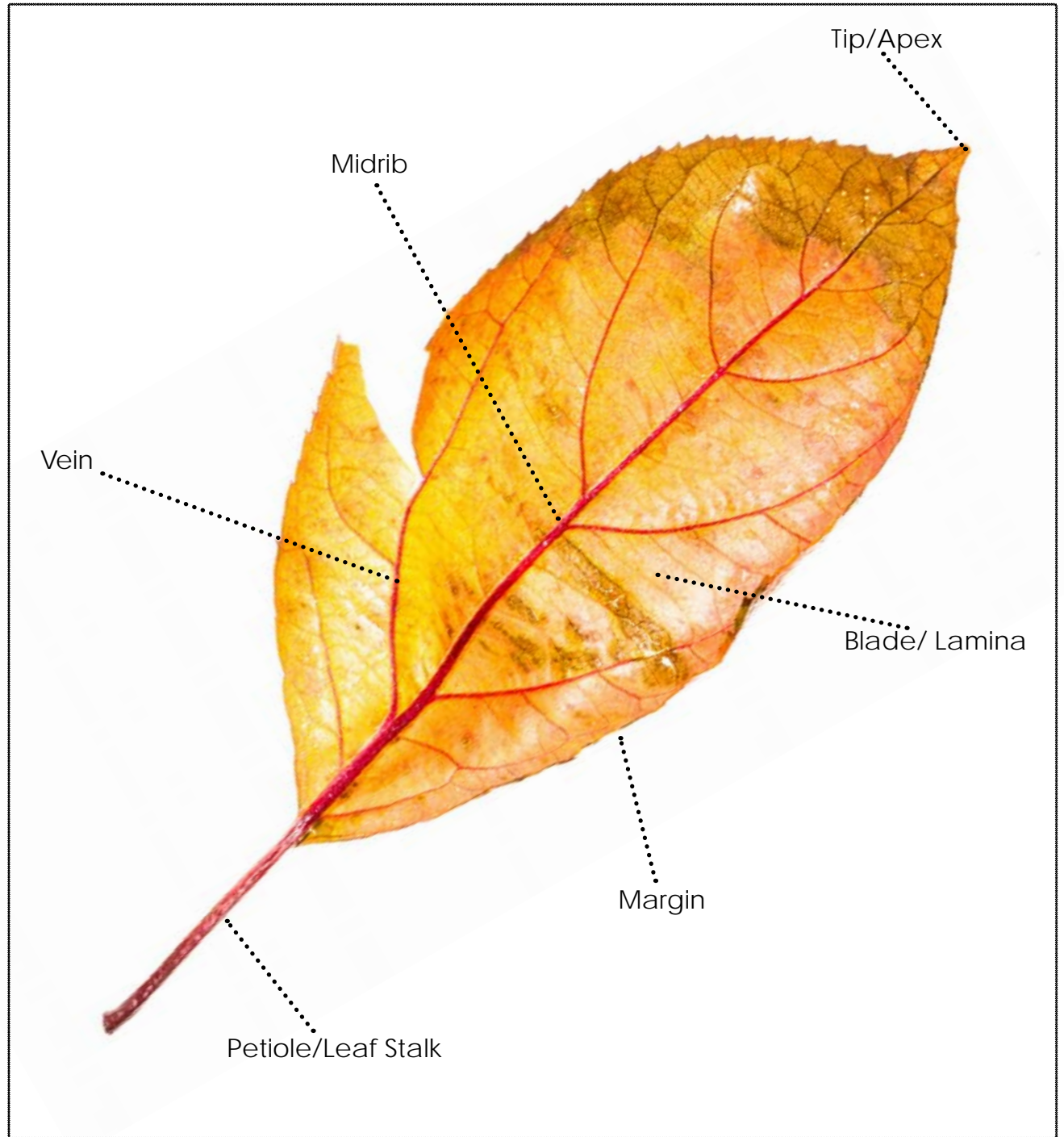




Above:
A damaged section of a leaf.

Right: Parts of a Leaf

Below:
A small insect trapped on a web on the
underside of an evergreen branch.





About the Author/Photographer:

Adrianna is a 5th year student at Rochester Institute of Technology, currently in her 3rd year in the Biomedical Photographic Communications program. She will be graduating in the spring of 2016. Currently she is enrolled in magnified imaging, programming, and surgical photography classes. Her favorite subjects to photograph are anything nature related.

Other interests include mathematics and science, specifically biology.

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Sources:

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- <http://www.earthintransition.org/2012/02/the-leaf-chaser/>
- <http://www.sciencemadesimple.com/leaves.html>
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The lighting process for the photographs featured was as follows:

Required equipment:

- Plexi glass sheet
- Copy stand
- Two flashes (master/slave)
- Flash sync cable



The plexi glass is set up approximately 9 inches away from the surface of the table. The subject is placed on the plexi glass and the camera is placed on the copy stand. One flash is set as the master and is connected to the camera via the flash cord. The second flash is set to slave and placed beneath the plexi glass under the subject. This method is used to clip the background to white, and can also be used to transilluminate a semi-transparent subject.

