Chapter 1

THE MAPLE

StandingNation-Human Alliance Bulletin

The Breath of Life

- **TREES oxygenate the Earth's atmosphere** by releasing oxygen into the air, allowing life to exist.
- **TREES combat climate change**: removing carbon dioxide from the air and sequestering carbon in the trees and soil, which reduces the overall concentration of greenhouse gases in the atmosphere and allows excess heat to escape from the surface of the earth.
- **TREES improve air quality**: removing particulate matter—dust and debris—from the air with the surface of their leaves and five main toxic gases—ground-level ozone, carbon monoxide, nitrogen oxides, sulfur oxides and lead—from the air through their leaves' stomata.
- **TREES reduce human respiratory health problems**, particularly for children, the elderly, and people of all ages who have lung diseases such as asthma.
- **TREES then encourage us to use our healthier lungs as trees promote greater human physical activity** by providing inviting and cool areas for relaxation and recreation, such as in parks and playgrounds.

Diplomatic Relationships

- Maple is considered a "tonewood," a wood that carries sound waves well, and is used in numerous string and percussive musical instruments. The back, sides, and neck of most violins, violas, cellos, and double basses are made from maple. Many Stradivarius and other older Italian violins (before 1700) are believed to have been constructed from Norway maple.
- The Norway maple was brought to Philadelphia from England in 1756 by John Bartram as a hardy shade tree that could adapt to adverse conditions[1].
- In 1934, "nine-tenths of the trees planted in the United States [were] maples."[2]
- Norway maples were often planted to replace the elm trees lost to Dutch elm disease in the middle of the 20th century.
- Today, the Norway maple is considered invasive, displacing native trees and plants with its canopy of dense shade. "Although thought to have allelopathic properties [meaning that the plant releases toxins that inhibit or prevent the growth of other plants], research has not been able to confirm this."[3] The recommendation is to not plant the species, to plant sugar maple or red maple instead.

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[1]. Nowak D.J. and A.R. Rowan. 1990. "History and Range of Norway Maple." *Jouranl of Arboriculture* a6:291-296 quoted by George Shakespere, "Norway Maple," *Introduced Species Summary Project* (New York, NY: Columbia University, 2003) http://www.columbia.edu/itc/cerc/danoff-burg/invasion_bio/inv_spp_summ/Acer_platanoides.html (accessed 2/28/21).
[2] Margaret Curtin Finlay, *Our American Maples & Some Others* by (New York: The Georgian Press, 1934), p. 2.
[3] Nowak D.J. and A.R. Rowan. 1990. "History and Range of Norway Maple." *Jouranl of Arboriculture* a6:291-296 quoted by George Shakespere, "Norway Maple," *Introduced Species Summary Project* (New York, NY: Columbia University, 2003) http://www.columbia.edu/itc/cerc/danoff-burg/invasion_bio/inv_spp_summ/Acer_platanoides.html (accessed 2/20/21).

- By the early 1700s, the maple leaf was being used by the French Canadians on the St. Lawrence River as an emblem of their region. Today, the maple tree is the national tree of Canada. Since 1965, the Canadian flag and coat-of-arms bears a stylized rendition of a sugar maple leaf. The maple leaf is considered a symbol of strength and endurance, but one species of maple in particular—the *sugar* maple—is particularly important to Canada, as maple syrup is one of the things for which the country is known.
- Sugar maples can be tapped for their sap, which when boiled down, can be used to produce maple syrup or maple sugar. Forty gallons of sugar maple sap are needed to make one gallon of maple syrup.

A Tourist's Testimonial

> *I always feel at home where the sugar maple grows. . . . stately as a forest tree, comely and clean as a shade tree, glorious in autumn, a fountain of coolness in summer, sugar in its veins, gold in its foliage, warmth in its fibers, and health in it the year round.*[4]
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> —John Burroughs (1837-1921)

[4] John Burroughs, in his notes, as reproduced by Clara Barrus, in the Preface of *Under the Maples* (Boston: Houghton Mifflin Company, 1921).

Tree-Tripping

Spring:

Go maple sugaring! In the spring, states in addition Vermont and regions beyond New England host maple festivals, where you can observe the process of tapping maple trees, boiling down the collected sap, and producing maple syrup. The range of the sugar maple is widespread in mixed hardwood forests of eastern North America: from Nova Scotia and New Brunswick westward to Ontario and Manitoba, North Dakota and South Dakota; southward into eastern Kansas into Oklahoma; and southward in the east through New England to Georgia. In the Metro Detroit and Ann Arbor area alone, at least five maple sugar festivals and sugaring events are celebrated annually.

Regardless of whether you live within maple sugaring range, can you spot and identify a maple flower or two? From species to species, maple flowers vary widely in appearance and in color—white, yellow, green, red, hot pink. Examine them on the tree with binoculars, take some photographs of them on low-hanging branches, and find them below their trees after they fall in the spring.

Summer:

Find a maple key, the fruit of the maple tree—also often referred to as “helicopters” by children (and their grownups) because of the way the keys spin when they fall, suggestive of the revolving propellers of a helicopter. Maple keys vary in appearance by species. How many different kinds can you find?

Make a maple key mobile by stringing together a number of double and/or single maple keys on a length of thread, with knots below and above each key to hold it in

place. Hang the string in a window where the light can come through the thin-skinned wings holding the seeds.

For other craft ideas using maple keys, search the Internet for “maple-seed crafts.”

Fall:
Before the shortening and colder days make the leaves turn brown, you can hang on to autumn’s spectrum of color a bit longer by collecting a variety of colored maple leaves that have fallen. Arrange your finds sandwiched between two sheets of wax paper, cover the top piece of wax paper with a thin towel or a piece of paper, and, without steam, iron the maple leaf “sandwich” for a few moments.

You can leave the leaves between the wax paper for a translucent piece of art to hang in a window, or you can allow the leaves to cool with the wax paper on them and then peel the paper away. With the wax coating, the color of the leaves will be preserved for a few more weeks.

Tree Dreams

- What is your very first tree memory?
- Do you have memories that involve maple trees—their comforting form, winged seeds, or colored leaves—from your childhood or adolescence, as an adult or a parent?
- Do you have a relationship with a maple tree today? Do you know what species of maple the tree is?

Tree's Big Idea: **CHLOROPHYLL**

You may remember learning in elementary school that **chlorophyll** is what makes the leaves of trees look green to us. More scientifically, chlorophyll is a pigment, which absorbs violet, blue, and red wavelengths and reflects the green. No surprise that, in addition to trees, chlorophyll is found in all other plants and algae, as well as in cyanobacteria (blue-green algae). Regardless of what tree, plant, or algae the chlorophyll is in, it is contained in plastids—small, oblong, double-membrane organelles (cell organs)—that are called **chloroplasts**.

Scientists have found that land plants and algae share a common ancestor that lived around 1.9 billion years ago. This discovery involves chloroplasts. "We know that the chloroplast at some point was a free-living cyanobacteria," said Patricia Sánchez-Baracaldo from the University of Bristol, who led a study to explore the origins of the chloroplast.[1] Turns out, cyanobacteria is the earliest known form of life on earth. And, chloroplasts are where the magic occurs—performed by the magician chlorophyll—that has allowed other forms of life to develop over the intervening millennia.

What we notice on walks or through our windows during our spring and summer months is chlorophyll's role in creating an astonishing palette of greens. What is important for a tree, however—and, ultimately, most important for each of us—is chlorophyll's ability to trap and transform energy.

This may be the most authentic act of alchemy on earth: chlorophyll captures sunlight and transforms that trapped solar energy into chemical energy. We know the formula: when chlorophyll absorbs the energy flowing down and landing on leaf in the form of sunshine, an electron in each chlorophyll molecule is temporarily "excited" to a

higher energy state. (Different, but perhaps similar to, how Michiganders get excited to a higher energy level when the sun finally shines through our lake-effect clouds.)

Then, as the electron returns to its original energy level, the energy the electron releases in its drift to equilibrium powers the first part of photosynthesis, the process responsible for the air all living things breathe, a process we'll examine in Chapter 3. Spoiler alert: A byproduct of photosynthesis is oxygen. Photosynthesis is the only way oxygen—the one element that all living organisms on earth need to live—is produced on our planet. This is why chlorophyll is considered a foundation for all life.

In autumn, in response shorter days and colder temperatures, leaves produce less and less chlorophyll, which results in the leaves gradually losing their green color. The disappearance of green, allows other pigments in the leaves—yellow, gold, and orange (carotenoids), and red, crimson, and purple (anthocyanins)—to become visible.

Turning shades of orange, red, and gold, the sugar maple *(Acer saccharum)* is the primary color contributor to "foliage season" in North America, particularly in Central Ontario, Québec, northern New England, New York, Wisconsin, and Michigan. Red maples offer more varieties of reds and oranges, and Japanese maples add reds and purples.