

Chapter 2

THE AMERICAN SYCAMORE

StandingNation-Human Alliance Bulletin

A Natural High

TREES improve our mood:

A fractal is a rough or fragmented geometric shape that can be split into parts, each of which is (at least approximately) a reduced-size copy of the whole.¹

—French mathematician Benoit Mandelbrot

We've analyzed the [artist Jackson] Pollock [abstract drip-paint] patterns with computers and compared them to forest, . . .and they are fractal, reflecting the fingerprint of nature . . . they are exactly the same.

—Nanoparticle physicist Richard Taylor
“Fractal analysis of Pollock's drip paintings”²

“This [fractal] dimension does more than lull us; it can engage us, awe us and make us self-reflect.”

— Journalist Florence Williams
The Nature Fix
(W.W. Norton & Co., 2017)

TREES increase our state of relaxation. The green color of trees' leaves has been shown to relax both mind and body. Signifying health and life, color experts claim, green both soothes and refreshes us.³

Science offers proof of this claim. Much of the research into how trees have this effect on humans—instead of focusing on the human attraction to the fractal patterns or the color green inherent in forest—has focused on “the stress-

¹ Benoit Mandelbrot, *The Fractal Geometry of Nature* (New York, NY: Times Books, 1982)

² Richard Taylor, “Fractal Analysis of Pollock's Drip Paintings,” *Nature* 399, 422 (1999).
<https://doi.org/10.1038/20833> (accessed 10/01/20).

³ Ameritas, “Four Reasons Why You Need the Color Green,” *Wellness*, September 11, 2017,
<https://www.ameritasinsight.com/wellness/health-and-wellness/color-green-life> (accessed 1/07/21).

busting and mood-enhancing benefits of exposure to phytoncides in nature.”⁴

Phytoncides—also known as volatile oils—are substances released by trees and plants to defend against microbes, insects, and animals, which appear to have very positive effects on humans.

🌳 **TREES reduce stress.** Current research studies suggest that an urban environment encompasses a set of negative psychosocial influences that facilitate chronic stress. Other research shows that “living close to natural landscapes has beneficial effects on mental health, as well as well-being, mood, cognition, but also longevity and mortality.”⁵

An exploratory study group reported an interaction between the neuropeptide S receptor gene, that has previously been associated with anxiety and stress phenotypes, and urban upbringing that modulates the amygdala response during stress exposure⁶. Based on those earlier studies,

[Researchers] used structural equation modelling on 341 older adults to establish three latent brain factors (amygdala, pACC and dorsolateral prefrontal cortex (DLPFC)) to test the effects of forest, urban green, water and wasteland around the home address. [The] results reveal a significant positive association between the coverage of forest and amygdala integrity. We conclude that forests may have salutogenic⁷ effects on the integrity of the amygdala.⁸

⁴ Julia Previn, *The Healing Magic of Forest Bathing: Finding Calm, Creativity, and Connection in the Natural World* (New York, NY: Ten Speed Press, 2019), 15.

⁵ Kühn, S., Düzel, S., Eibich, P., *et al.*, “In search of features that constitute an ‘enriched environment’ in humans: Associations between geographical properties and brain structure.” *Scientific Reports* **7**, 11920 (2017). <https://doi.org/10.1038/s41598-017-12046-7> at <https://www.nature.com/articles/s41598-017-12046-7> (accessed 2/18/21).

⁶ *Ibid.*

(Definition from “Salutogenesis” in *Wikipedia* (accessed 2/18/21).

⁸ Kühn, S., Düzel, S., Eibich, P., *et al.*, “In search of features that constitute an ‘enriched environment’ in humans: Associations between geographical properties and brain structure.” *Scientific Reports* **7**, 11920 (2017). <https://doi.org/10.1038/s41598-017-12046-7> at <https://www.nature.com/articles/s41598-017-12046-7> (accessed 2/18/21).

Another study on the effects of being in a forest environment “measured fluctuations in salivary amylase, and indicator of changes in sympathetic nervous activity, and . . . concluded that forests were associated with less environmental stress.”⁹

In a review of field experiments across Japan, which compared physical markers of stress in natural environments to those in city setting:

“Compared to city environments, forest settings were associated with lower levels of cortisol, . . . greater activity of parasympathetic nerves that promote relaxation, and reduced activity of sympathetic nerves associated with ‘fight or flight’ reactions to stress.”¹⁰

⁹ M. Yamaguchi, M. Dguchi, Y Miyasaki, “The effects of exercise in forest and urban environments on sympathetic nervous activity of normal young adults” in *Journal of International Medical Research*, March-April, 2006: 34 (2) 152-9 at <https://pubmed.ncbi.nlm.nih.gov/16749410/> (accessed 2/20/21).

¹⁰ “Health Benefits” *Forest Therapy Association of the Americas*, <http://forest-therapy.net/healthbenefits.html> (accessed 2/28/21)

- ✦ The hollow trunks of old, giant sycamores have provided dens for black bears.
- ✦ Such hollow sycamores were also homes for chimney swifts in earlier times, before (and since) the human invention of chimneys. The first record of swifts nesting in chimneys dates to 1672, but swifts continued nesting in trees as well. In 1840 John James Audubon reported a colony of roughly 9,000 swifts living in a hollow sycamore tree.¹¹
- ✦ Other cavity-nesting birds who use sycamore trees include barred owl, eastern screech owl, great crested flycatcher and the wood duck.
- ✦ In northern and western parts of Maryland, at least, Yellow-throated Warblers prefer tall sycamores for nesting.¹²
- ✦ Sycamore seeds are eaten by some birds including goldfinch, purple finch, chickadees, and dark-eyed junco, as well as by squirrels, muskrats, and beaver.
- ✦ Hummingbirds and sapsuckers eat the sycamore's seeping sugary sap. The sapsucker also makes a series of little holes in a sycamore's bark, flies away, waits until insects come to feed on the sap, and then returns to make dinner of the bugs.
- ✦ Historically, Native Americans used hollowed-out tree sections for canoes.

¹¹ Michael J. Dacuto, "The Swifts of Summer," *Northern Woods*, August 9, 2010 https://northernwoodlands.org/outside_story/article/the-swifts-of-summer (accessed 11-16-20).

¹² Jane Hill, "American Sycamore: A Hospitable but Somewhat Lonely Tree," *Sycamore Islander*, February 2000, <http://www.sycamoreisland.org/articles/sa200002.htm> (accessed 11/16/20).

- ✘ Native Americans also used the sycamore for a variety of medicinal purposes, including cold and cough remedies, as well as dietary, dermatological, gynecological, respiratory, and gastrointestinal aids.¹³
- ✘ The Wyandotte tribe has a story that the great chief who ruled over evil spirits grew so angry with two of his acolytes that he cast them to Earth where they fell on two sycamore trees, and the trees were imbued with their wicked nature, causing them to become deformed with twisted branches.
- ✘ European settlers gave this tree its common name of sycamore because the leaves resembled the sycamore of the British Isles, *Acer pseudoplatanus*, which is actually a maple. In his 1662 *Slyva: Or a Discourse of Forest Trees & the Propagation of Timber*, John Evelyn identified European “sycomor” as one of the maples.
- ✘ When Europeans settled in this country, the most venerable sycamores were 500 to 600 years old. Some of these trees had very large, decayed, hollow trunks, which were used to stable animals, or even house an entire family until a log cabin could be built.
- ✘ The name “Ghosts of the River” came from the fact that sycamores, who often choose riverbanks upon which to grow and usually have upper branches, reaching high above their neighboring species of trees, present arms that glow white in winter light after they’ve dropped their leaves and as they shed their bark, a very visible way to trace the course of a river.

¹³ Deane Jordan (AKA the forager “Green Deane), “Sycamores Get No Respect”, *Eat the Weeds and Other Things, Too*, <http://www.eattheweeds.com/sycamores-not-just-another-plane-tree-2/> (accessed 11/17/20).

✦ “. . . [T]he New York Stock Exchange can trace its roots, literally, to a buttonwood tree that once stood outside of 68 Wall Street in New York City. On May 17, 1792, 24 stockbrokers met under this tree to sign an agreement that started the New York Stock & Exchange Board; now known as the New York Stock Exchange. The signed document is referred to as ‘The Buttonwood Agreement.’”¹⁴

✦ Because of its size and ability to withstand urban environmental factors, the sycamore has been planted extensively as a shade tree.

A Tourist’s Testimonial

*“At any season a tree is as distinctive and individual as a person.”*¹⁵

—Margaret Curtin Finlay

¹⁴ Joe Boggs, “Ode to the Buttonwood Tree,” *Buckeye Yard & Garden online*, posted 10/18/17 <https://bygl.osu.edu/index.php/node/939> (accessed 11/17/20).

¹⁵ Margaret Curtin Finlay, *Our American Maples & Some Others*, (New York: The Georgian Press, 1944), 4.

Tree-Tripping

- Have you ever nailed a nail, screwed a screw, twisted a hook into a tree trunk or one of its branches?
- Have you ever hung a birdhouse, a hammock, a clothesline from a tree?
- Do you live near a tree bound in some way, like by ropes, cables, wood, fences, nails, or screws?
- Can you help trees you know whose bark has been harmed in some way?

Tree Dreams

- 🔗 What experiences have you had climbing up into the arms of a tree?
- 🔗 Did you have tree-house memories?
- 🔗 Have you ever had a relationship with a sycamore?
- 🔗 Which of the trees with whom you are familiar exfoliate their bark and which crack and furrow?
- 🔗 Make a list of questions you have about a favorite of tree with whom you share proximity. Where might you find the answers?

Tree's Big Idea: BARK

Bark is the protective covering for the living parts of the tree beneath it. This protection includes protecting the tree from parasites, preventing water loss, and insulating the tree from heat, which reduces a tree's vulnerability to fire.

Most young trees have smooth bark. As the tree ages, its bark generally gets tougher. While sassafras tree bark stays smooth (and green) for a long time, it eventually toughens up. Beech trees are one exception to this rule, ironwood trees another.

As the interior of the tree grows, its bark needs to peel off or crack open, and each tree does this in a way that is characteristic of its species. Along with river birch, yellow birch, crêpe myrtle, juniper/Eastern redcedar, northern white-cedar, and shagbark hickory, sycamore has an exfoliating bark. However, the majority of tree species have bark that cracks or divides to accommodate the tree's expanding trunk. Each species of trees has bark that cracks or divides and heals into furrows in a way that is characteristic of the species. This is one of the identifying features, along with the habit—the architecture—of the tree's trunk and branches, useful in winter.

After an injury to the wood of a tree trunk, the formation of new cells is not possible. Instead, the tree's reaction is to seal off damaged tissue from healthy tissue by sealing off the water-conducting elements.

Protecting injuries that extend into the wood—like drill holes—and which affect the cambium, the delicate meristematic (embryonic tissue consisting of undifferentiated, growing, actively dividing cells) tissue between the inner bark (phloem) and the wood

(xylem), which is responsible for producing new phloem on the outside and new xylem on the inside (and which forms the annual rings of wood) involves several strategies:

- Strategy 1: First, on the outside, a callus develops at the wound margin followed by the formation of woundwood—the process of covering and sealing the wound. This process may take year.
- Strategy 2: Near the wound, the cambium forms a new layer of living cells—the barrier zone—setting chemical and physical boundaries around the damage to prevent decay microorganisms from spreading, and separating new wood from all the wood that existed at the time of the injury.
- Strategy 3: If cells capable of division are left on the sound surface (“collision damage”), they can form a layer of callus on the wound surface.

The reaction of the wood to a wound is referred to as “compartmentalization.” If air enters the wound and spreads in water-conducting tissue, the vessels no longer function to transport water and the water-conducting tissue is rapidly closed. The parenchyma cells (the thin-walled cells able to divide) die off. Dead and nonfunctional tissue becomes discolored. Dead tissue can become colonized by harmful organisms.

Compartmentalization and encapsulation of damage take place in sequential phases. Phases of a tree’s reaction to injury: 1) Entry of air; 2) Entry of harmful organisms (e.g., wood-destroying fungi); 3) Spread of harmful organisms; 4) Encapsulation of harmful organisms.¹⁶

¹⁶ Dirk Dujesiefken and Walter Liese, “Compartmentalization of Damage in Trees,” *The CODIT Principle: Implications for Best Practices*, <https://plantscience.psu.edu/research/projects/vegetative-management/meeting-information/compartmentalization-of-damage-in-trees-codit> (accessed 2/28/21).