

## THE EASTERN COTTONWOOD

*StandingNation-Human Alliance Bulletin*

Green Ritalin

**TREES improve several cognitive faculties in humans**—focus (the ability to narrow one’s attention to a mental task), concentration (the ability to deepen one’s attention to a mental task), and memory—increasing work productivity in adults and decreasing ADHD symptoms in children.

In a 2008 study “The Cognitive Benefits of Interacting with Nature,” the researchers explain in the study’s abstract:

“Attention restoration theory (ART) provides an analysis of the kinds of environments that lead to improvements in directed-attention abilities. Nature, which is filled with intriguing stimuli, *modestly* grabs attention in a bottom-up fashion, allowing top-down directed-attention abilities a chance to replenish. Unlike natural environments, urban environments are filled with stimulation that captures attention *dramatically* and additionally requires directed attention (e.g., to avoid being hit by a car), making them less restorative. We present two experiments that show that walking in nature or viewing pictures of nature can improve directed-attention abilities as measured with a backwards digit-span task and the Attention Network Task, thus validating attention restoration theory.<sup>1</sup>

One of these experiments involved University of Michigan students being split into two groups and given a brief memory test. One group took a walk around the university’s arboretum, and the other group took a walk down an Ann Arbor city street. When the

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<sup>1</sup> Berman MG, Jonides J, Kaplan S. “The Cognitive Benefits of Interacting with Nature,” *Psychological Science*. 2008;19(12):1207-1212. doi:10.1111/j.1467-9280.2008.02225.x (accessed 2/26/21).

participants returned and took the test again, those who had walk among trees performed almost 20% better than the first time. The ones who had taken the walk on the city street did not consistently improve.<sup>2</sup>

In a similar study on depressed adults, it was found that walks in nature boosted working memory much more than walks in urban environments.<sup>3</sup>

In a study published in 2004, the objective of which was to examine the impact of relatively “green” or natural settings on the symptoms of the most common neurobehavioral disorder of childhood, ADHD, across diverse subpopulations of children. The study’s abstract explains the researchers’ methods, results and findings:

*“Methods.* Parents nationwide rated the aftereffects of 49 common after-school and weekend activities on children’s symptoms. Aftereffects were compared for activities conducted in green outdoor settings versus those conducted in both built outdoor and indoor settings.

*Results.* In this national, nonprobability sample, green outdoor activities reduced symptoms significantly more than did activities conducted in other settings, even when activities were matched across settings. Findings were consistent across age, gender, and income groups; community types; geographic regions; and diagnoses.

*Conclusions.* Green outdoor settings appear to reduce ADHD symptoms in children across a wide range of individual, residential, and case characteristics.”<sup>4</sup>

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<sup>2</sup> Ibid.

<sup>3</sup> Berman, MG, Kross E, Krpan K, Askren M, Burson A, Deldin P, Kaplan S, Sherdell L, Gotlib I, Jonides J, “Interacting with nature improves cognition and affect for individuals with depression,” *Journal of Affective Disorders*, 2012; 140 (3): 300-305. Doi:10.1016/j.jad.2012.03.012 at <https://www.sciencedirect.com/science/article/pii/S0165032712002005> (accessed 2/26/21).

<sup>4</sup> Kuo, F.E. Taylor, A.F, “A Potential Natural Treatment for Attention-Deficit/Hyperactivity Disorder: Evidence from a National Study,” *American Journal of Public Health*. 2004 September; 94(9): 1580–1586. doi:10.2105/ajph.94.9.1580 (accessed 2/26/21).

A simple walk in the woods—even as little time as 20 minutes a day, six days a week spent with trees<sup>5</sup>—can help a human of any age be happier more focused and productive.

### *Diplomatic Relationships*

- ✘ The Bodéwadmi (aka Potawatomi), the Ojibwe (aka Chippewa), and the Odawa (aka Ottawa) of Michigan used the cotton of the seed parachutes as absorbent material and used the buds and seed capsules as food.
- ✘ The cottonwood tree is sacred to many other Native Americans, particularly in the Southwest.
- ✘ The Apaches consider cottonwood trees a symbol of the sun.
- ✘ Some northern Mexican tribes associated cottonwoods with the afterlife, using cottonwood boughs in funeral rituals.
- ✘ Labeling the cottonwood tree "the pioneer of the prairie", the Kansas state legislature designated the cottonwood the official state tree of Kansas in 1937.

### *A Tourist's Testimonial*

*Perhaps you have noticed that even in the very lightest breeze you can hear the voice of the cottonwood tree; this we understand is its prayer to the Great Spirit, for not only men, but all things and all beings pray to Him continually in differing ways.*

—Heñáka Sápa (aka Black Elk, 1863 – 1950)

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<sup>5</sup>White, M, Alcock I, Grellier J, Wheeler B, Hartig T, Warber, S, Bone A, Depldge M, Fleming L, "Spending at least 120 minutes a week in nature is associated with good health and wellbeing," *Scientific Reports*. 2019;9:7730. doi: 10.1038/s41598-019-44097-3. (accessed 2/26/21).

## *Tree-Tripping*

Try this:

1. Mark your calendar for early to mid-June.
2. Locate a stream, river, or lake on a map near you, and take a trip to it.
3. Search the treetops for sunlight glinting off the fluttering leaves of the cottonwood.
4. Watch for the “summer snow” of the tree’s seed parachutes.
5. See where the seed parachutes land. Can you find any that have landed in mud?  
If so, these cottonwood seeds may have the opportunity to germinate, to become seedlings, saplings, mature trees.
6. Imagine: An Eastern cottonwood rising from this very spot when your grandchildren are grown.

## Tree Dreams

- 🔗 What memories of trees do you have from your elementary school years?
- 🔗 Have you ever discovered that a tree you had called by one name actually had a more accurate name?
- 🔗 Do you have any memories that involve cottonwood trees?
- 🔗 Do you have a relationship with a cottonwood tree today?
- 🔗 What story does a specific tree species stake in your memory?

## Tree's Big Idea: LIGNIN

Lignin is what makes cottonwoods and all other trees able to stand up against gravity, by resisting compression. Lignin, a biopolymer (i.e., a complex organic compound of high molecular weight), makes up 20 to 35% of the wood of trees. It is found in cell walls in the spaces between cellulose fibers and serves to strengthen the cell walls of the wood cells found in a tree's support tissues. But, lignin does much more than increase the strength of the tissues of tree trunks by adding rigidity, giving trees their shape, and making them resistant to wind.

Because it is hydrophobic, meaning it's not attracted to water, lignin also helps in conducting water up into a tree, allowing water to flow past it instead of inviting water to be absorbed into it. Lignin is considered a resinous substance that consists of different aromatic basic building blocks, phenylpropanoids.

Phenylpropanoids are found throughout the plant kingdom, where they serve as essential components of a number of structural polymers, provide protection from ultraviolet light, defend against herbivores and pathogens, and mediate

plant-pollinator interactions as floral pigments and scent compounds.<sup>6</sup>

Phenylpropanoids is the characteristic of lignin that makes wood pest resistant and prevents wood and bark from rotting easily. These phenylpropanoids in lignin are responsible for our enjoyment of the aroma and flavor of smoked and barbecued food. Throughout the entire plant kingdom, lignin is responsible for the crunch of carrots as well as the “fiber” in all other vegetables, whole grains, and dried fruits.

Lignin evolved during and contributed to defining the Carboniferous Period, a 60-million-year period 358.9 million years ago. Today, lignin constitutes 30% of non-fossil carbon on the planet. Our use of lignin since the Industrial Revolution has not been kind to our planet’s water or air. Case in point, lignin is colored and has to be removed from lignocellulose in order to manufacture high-quality paper. If lignin is not removed before the paper is made, the paper yellows in the air and the paper is weaker (you can observe both of these qualities in newsprint, from which lignin is not removed). The removal of lignin is the main source of pollution in pulp and papermaking wastewater<sup>7</sup>.

On the one hand, once lignin is separated from cellulose commercially, it can be burned as fuel, providing the energy for the mill in which it was removed. But, while lignocellulose is under study as an alternative to petroleum, lignin also provides a significant environmental concern, as the burning of it releases the amount of carbon dioxide that was stored in the tree when it was alive into the atmosphere.

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<sup>6</sup> “Phenylpropanoid,” *Wikipedia*, <https://en.wikipedia.org/wiki/Phenylpropanoid> (accessed 10/06/20)

<sup>7</sup> “. . . [P]oplar wood [is] a very acceptable raw material for the pulp-and-paper industry. . . . [P]oplar (mostly aspen) is the leading hardwood pulpwood species in the [Great] Lakes States and eastern Canada.”

Nonetheless, scientists believe that lignin, specifically from hybrid cottonwood, can “help reduce nitrate infiltration into streams and aquifers.”<sup>8</sup>

Research has also shown that lignin and lignin residues have a greater absorption capacity and cost less than other methods of removing heavy metals, from wastewater typically produced by the tanning, steel production, and electroplating industries,<sup>9</sup> significantly contributing to our water pollution challenges.

Regardless of how the human community continues to make use of lignin in ways which abuse or aid our planet, lignin was what provided the “backbone” of the beautiful massive Cottonwood Trees along The Creek, the first members of the Standing Nation with whom I was on intimate terms, and for whom I still mourn decades later.

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<sup>8</sup> <http://news.cahnrs.wsu.edu/article/poplars-popular-for-paper-pulp/> (accessed 9/29/20)

<sup>9</sup> [https://www.researchgate.net/publication/326300800\\_Lignin\\_and\\_Lignin\\_Based\\_Materials\\_for\\_the\\_Removal\\_of\\_Heavy\\_Metals\\_from\\_Waste\\_Water-An\\_Overview](https://www.researchgate.net/publication/326300800_Lignin_and_Lignin_Based_Materials_for_the_Removal_of_Heavy_Metals_from_Waste_Water-An_Overview) (accessed 10/05/20)