



Species Potlight Paper Birch

Betula papyrifera



Neanderthals loved paper birch trees. Okay - “love” may be speculative, but how could they not have? Recent archeological research has shown that for over 100-thousand years it was integral to the making of the thrusting spears that allowed them to hunt large, “charismatic megafauna” prey like mammoth, woolly rhinoceros, and straight-tusked elephants. Sure, using the wood for a spear shaft was a no-brainer, but more unexpectedly, Neanderthal inventors devised a way of using fire to extract an extremely sticky pitch from birch bark that was critical for glueing and hafting spearheads to the shaft. Some archeologists think it’s the world’s oldest example of a hominid (primate family that includes humans) made synthetic substance.

Paper birch has been inextricably woven into the lore and legend of the Northwoods for millennia. It’s wood, sap, and bark have been utilized for canoe and snowshoe crafting, birch beer and syrup, a waterproof wigwam covering, moose-calling horns, a life-saving fire starter, and numerous natural remedies. Able to survive temperatures colder than -40F, it is supremely adapted to tolerate and exploit the harsh conditions of northern ecosystems that make most other trees tap-out. But as with all cold-adapted species, it’s range is expected to greatly shrink over the coming decades as the climate continues to warm.

Life’s a Birch - Then They Die.

In many maturing forests of the Northeast, you most often spot the gleaming white bark of this tree only on a rotting log on the forest floor or on a standing dead tree snag. But don’t feel bad for them, this was the plan all along. Paper birch employ an interesting and effective “get in fast, produce and distribute seeds far-and-wide, and die” strategy that has worked well for them for eons. Known as what forest ecologists call a “pioneer species”, paper birch are one of the first northern trees to settle in open areas.

When their seeds land on bare soil with ample access to sunlight, they are able to germinate and grow quickly, before other trees and plants can shade them out. By the time they reach seed-producing age (as early as 15 years old), the process of forest succession may have begun around them, in which case the birch tree’s days are numbered. They don’t compete well with other species nor tolerate shade well. A forest-grown paper birch that reaches over 120 years is venerable indeed.

Sunshine on my Trunk Makes me Crack.

Of course sunlight is an absolute necessity for trees and all photosynthesizing plants to grow and survive. But in far northern climates, once a deciduous (broad-leaved) tree has dropped it’s leaves for the winter, sunlight jumps from

the asset column to the liability one. You might think that any sunshine a tree can get in the winter would be a welcoming warmth, but this warming actually puts the tree in great peril. When a tree warms, it expands. Warmed for long enough that expansion will reach all the way into the interior of the tree. Once the sun sets, temperatures can drop rapidly. If the exterior of the tree cools (and shrinks) faster than the interior, it will split and crack, sometimes with dire consequences for the tree. Many northern tree species try to combat this danger by growing a thick, flaky, and/or deeply ridged bark: think hemlock and white pine. The deep ridges act like radiators, dispersing heat, and dark bark actually cools down faster than lighter bark, giving heat less time to penetrate further into the tree.

The paper birch opted for a different approach. As a pioneer species, birch are sometimes the only trees growing in an open area, and thus can be bombarded by sunlight all day-long in winter. It’s thin, peeling, curly, white bark reflects the majority of the sun and heat away for the tree, greatly reducing sunscald damage risk. The peeling strips of bark also make it hard for lichens and mosses to get a foothold on the trunk. Large patches of mosses and lichens could block sunlight for photosynthesis (more on this momentarily) and, if dark-colored, contribute to damage from overheating.

The thinness of its bark brings with it another advantage. Paper birch are able to photosynthesize through the bark of their limbs and trunk, even on warm, late-winter days. Sunlight can penetrate the thin outer bark to reach a corky layer of inner bark containing chlorophyll allowing for late-winter photosynthesis as the lenticels (the horizontal black lines on birch bark) exchange oxygen for CO₂. This is a big advantage in late-winter/early spring as the year’s new sprouts and buds are able to get a bit of a head start on the growing season.



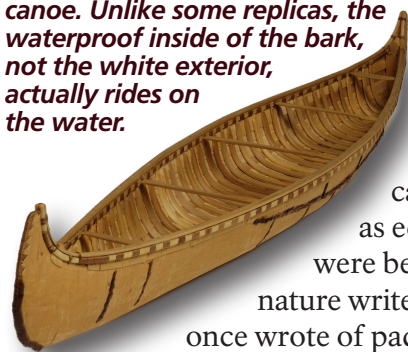


The black, horizontal lines in birch bark (left), called lenticels, allow for the gas-exchange of CO₂ and oxygen during bark photosynthesis. Paper birch seeds falling on snow (middle) can be blown far and wide by winter winds. Many wildlife species utilize paper birch. A Yellow-bellied Sapsucker (right) drills holes to drink sap and munch on insects that get stuck in it.

Yah sure, You Betulin

The most obvious and instantly identifiable characteristic of paper birch is that bright white bark. The culprit behind this whiteness is a fascinating compound called *betulin*, a hydrophobic (literally: water-fearing) molecule. Many a boy and girl scout have gazed in wondrous befuddlement as their scout-leader dunked a strip of birch bark into a lake, only to use it to start a campfire moments later. So flammable is it that in its powdered form betulinic acid is actually an explosion hazard when exposed to flame.

Algonquin style birch bark canoe. Unlike some replicas, the waterproof inside of the bark, not the white exterior, actually rides on the water.



Several Native American cultures took full advantage of the water repellency of paper birch bark, crafting water-carrying vessels and canoes from it that were as equally practical as they were beautiful. Early 20th century nature writer Donald Culross Peattie once wrote of paddling a birch-bark canoe:

“At the first stroke of the paddle it shot out over

the lake-water like a bird, so that one drew a breath of the purest ozone of happiness, for on all the waters of the world there floats no sweeter craft than this.”

Betulin also effectively deters bacteria, fungi, insects and gnawing animals from damaging the tree. And some pharmaceutical companies are investigating its possible role in anti-cancer drugs.

The Tiny Tumbleweed of Seed

Paper birch trees produce male and female

flowers that take the form of long, cylindrical “catkins” when they mature. Eventually seeds begin to drop by later summer - not uncommon for many tree species. But paper birch take it a step further. Many catkins stay on the tree into the



spring, dispersing seeds all the while. This is a trait birch have evolved in order to take advantage of a snow-laden landscape. The tiny seeds (~2mm long) landing on a crusty layer of snow that stretches for miles in all directions have a much greater chance of being blown far and wide over the surface of the snow as opposed to getting snagged by leaves and other debris on a snowless landscape. On your next winter jaunt into the woods where paper birch grow, look down - you are bound to notice birch seeds scattered across the snow.

The Giving Tree.

Over a several year time-span, a stand paper birch trees are capable of releasing many millions of seeds. Obviously the vast majority of those never realize into a tree, but they are a welcome food supply for ground-feeding birds like Ruffed Grouse at a time of year when food is becoming scarce. Many other bird species gain a substantial portion of their annual diets from birch seed including Black-capped Chickadees, Common Redpolls, Pine Siskins, and Fox Sparrows as they poke at seed-filled catkins. Beyond seeds, Yellow-bellied Sapsuckers feed on the sap, and Philadelphia Vireos, Red-shouldered Hawks, and Black-throated Green Warblers peel off and weave birch bark strips into their nests.

Paper birch is also known for supplying people with a delicious beer (of the “root” ilk rather than “lite”). Birch sap is rich in fructose, as opposed to the high levels of sucrose in sugar maple. Sucrose lends itself better to syrup making, but birch fructose sap is best when reduced into a cool, refreshing beverage. Grab one and raise it up to cheers the paper birch!

*“I’d like to go by climbing
A birch tree, And climb
black branches up a snow-
white trunk toward heaven,
till the tree could bear no
more, But dipped its top
and set me down again.
That would be good both
going and coming back.
One could do worse than be
a swinger of birches.
- Birches. Robert Frost. 1969*

For more

- [Read about](#) the possible future of paper birch and other tree species in Vermont’s Marsh-Billings-Rockefeller NHP as the climate continues to warm.