The Outside Story

Bark Helps Trees Weather Winter

By Catherine Wessel

When I think about winter survival, my mind first goes to wildlife: field mice curling up in nests, chickadees flocking to bird feeders, and amphibians burrowing into the mud. Rarely do I think about the adaptations of our northern species that can't grow thicker fur, fluff up their feathers, or go underground. Trees, for instance, face the same freezing temperatures, wet weather, and harsh winds – all with the added challenge of not being able to move. One way trees endure winter is through adaptations in their bark. With the deciduous leaves long gone, the winter forest has been laid bare, giving us the perfect conditions to attune ourselves to the strategies of tree bark.

Paper birch (*Betula papyrifera*) is one of the most familiar characters on a walk in the winter woods. Its distinctive bright white, straight trunk stands out against the blue sky on clear days, and it's easily distinguished by its bark that peels off in horizontal curls. It is also one of our northernmost hardwoods. Ranging across Canada and the northern United States, and occasionally found as far south as North Carolina, the paper birch is notable for surviving nearly to the tree line in the arctic, a place where few hardwoods can reach. Part of its success lies in its white bark: though it may be counterintuitive, the bark reflects heat and prevents the tree from warming up too much, protecting it against damage from changes in temperature. This adaptation is especially important in winter, when fluctuations are extreme between dark, cold nights and sunny days with no cover. Regulating temperature is essential for avoiding injury, such as sunscald and frost cracks, and this adaptation is so effective that arborists sometimes wrap light-colored material around planted trees that have dark bark to protect them.

Quaking aspen (*Populus tremuloides*) and balsam poplar (*Populus balsamifera*) also have light-colored bark and can thrive at this northern edge. Some species with light bark have the added advantage of bark that can photosynthesize in winter; aspen and paper birch are notable for this ability. Multiple adaptations ensure that trees are well prepared to survive the northern winters.

American beech (*Fagus grandifolia*) can also photosynthesize through its bark, although it doesn't grow as far north as these other species. Its range extends from Florida to Quebec and into the Midwest. When healthy, it has smooth, unbroken gray bark, and can live to 400 years old. Beechnuts provide important mast for a variety of wildlife species and were once the primary food source for the now extinct passenger pigeon. The thin bark on American beech can photosynthesize, even in temperatures below freezing, giving the beech a bump in energy to help sustain it through this season. Although this adaptation helps the tree throughout winter, photosynthesis through bark becomes most active in the "vernal window," the shoulder season between winter and spring, after snowmelt and before leaf out, when trees need energy for new growth.

While thicker bark on many tree species prevents sunlight from reaching the photosynthesizing cork skin, this bark offers a different benefit by protecting and insulating the tree from temperature changes. Michael Wojtech, author of *Bark*, refers to the thick plate-like bark of the eastern hemlock (*Tsuga canadensis*) as "radiator fins." These blocky sections of bark increase surface area for air to move around, distributing heat and maintaining even temperatures. Because hemlocks retain their needles all winter, little sunlight reaches bark anyway, so this adaptation serves this tree well. Eastern white pine (*Pinus strobus*) has similarly thick and furrowed bark.

With the distraction of other growing things gone for the season, winter is an ideal time to turn our attention to tree bark and admire not only the great variety of subtle colors and textures, but also to ponder how these qualities facilitate different strategies for surviving the winter. On your next walk through the winter woods, you may notice the shreddy bark of hophornbeam (*Ostrya virginiana*), the great diamond ridges of white ash (*Fraxinus americana*), and the burnt potato chip bark of black cherry (*Prunus serotina*). How do each of these types of bark help the trees?

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