The Outside Story

Surprising Sugarmakers in the Late Winter Woods

By Sam Blair

As steam rises from sugarhouse cupolas and early morning coffee pots, sugarmakers are working overtime to turn maple sap into golden syrup. But as it turns out, they aren't alone: other living things are sugaring too, and their stories affect the syrup that is poured on your pancakes (or into your morning coffee).

Many sugarmakers' most familiar – and troublesome – non-human coworkers are red squirrels, which chew holes in the soft plastic lines of sugarbush tubing networks to get at the sap inside. In a 1992 study, biologist and author Bernd Heinrich found that red squirrels are not just sap thieves: they also "tap" their own sugar maples, biting through the trees' outer bark and returning to lick up partly-dried streaks of candied sugar and syrup. Heinrich noticed that his local red squirrels had much in common with human sugarmakers: they selected sugar maples almost exclusively, got up early to check their taps, and sugared only on warm days in late winter and early spring.

Some winter birds, including the evening grosbeak, Bohemian waxwing, and cedar waxwing, also enjoy maple sap, which they sip from the broken ends of sugar maple twigs – but only as part of a balanced winter diet. Grosbeaks eat a healthy mix of tree seeds, buds, and overwintering insects, while waxwings have a serious sweet tooth (or beak?) for the fruits of trees such as crabapple, hawthorn, and cedar.

Yellow-bellied sapsuckers, our most creatively-named woodpeckers, excavate rows of shallow "wells" in the bark of a few favored tree species. Their taste in trees changes through the year, and in late spring, maples are on the menu. During frequent visits, they renew their wells, lap up sap, and gobble insects trapped within it.

As sapsuckers seem to understand, insects are probably the biggest group of sap-eaters in our northern forests. One Canadian study documented 28 species of winter-active beetles, caddisflies, fireflies, and moths at sap pails, including multiple owlet moths in the family *Noctuidae*. Although the noctuids, which some sugarmakers call "sap moths," are dressed in unassuming browns and grays, they have a remarkable

trick up their sleeves: flying and feeding in near-freezing temperatures, even though they are cold-blooded. In another study, Heinrich found that noctuid moths were shivering themselves up to temperatures as hot as 95° Fahrenheit, and then using their dense, fuzzy coats and clever circulatory systems to hold onto the warmth. If you're a moth, this is a pretty good trick, as most of your avian predators are still on vacation in late winter and early spring.

All this maple drama is visible to the naked eye, but put a drop of maple sap beneath a microscope, and you'll find a whole world of very small organisms enjoying their own maple feast. Studies find that bacteria and yeasts with names like *Pseudomanus tolaasii* and *Mrakia gelida* live on maple bark and inside the tubing of sap collection networks. As the days warm, these microorganisms proliferate, eventually turning sap brown and mucky and spoiling late season syrup.

But the maple microbiome isn't all bad! Many of those wonderful, elusive flavors – the ones that evoke notes of vanilla, pine, butter, and even flowers – get their start when microorganisms break the sucrose in maple sap into other forms of sugar like glucose and fructose, as well as aromatic compounds like vanillin and syringaldehyde. While these names may sound strange, they taste delicious; and they're important enough that they explain much of the change in syrup flavor and color, from "golden-delicate" to "dark-robust," as spring progresses.

Maples also derive surprising benefits from the microorganisms in their sap. Research shows that some strains of bacteria and yeast in maple sap act like a biological band-aid, proliferating at the site of injuries and staunching the "bleeding" of broken sap vessels until the tree can heal. This response can be frustrating if you're a sugarmaker and the injury is a freshly-drilled taphole, but as far as the tree's concerned, it's just what the doctor ordered!

As the sugaring season continues, remember you're not the only one enjoying the bounty of maple trees, and take a moment to think of the yeasts, birds, squirrels, and moths. While some might be stealing a taste of maple sap, others have helped give your syrup that special, nuanced flavor.

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