The text below was transcribed from video footage taken of Dr. Marvin Pritts leading a walk in Smith Woods, Trumansburg, NY, in 2015. Dr. Pritts is Professor in the Horticulture Section of Cornell University's School of Integrative Plant Science, and is an expert on Smith Woods. The images in this document are stills captured from the video footage.

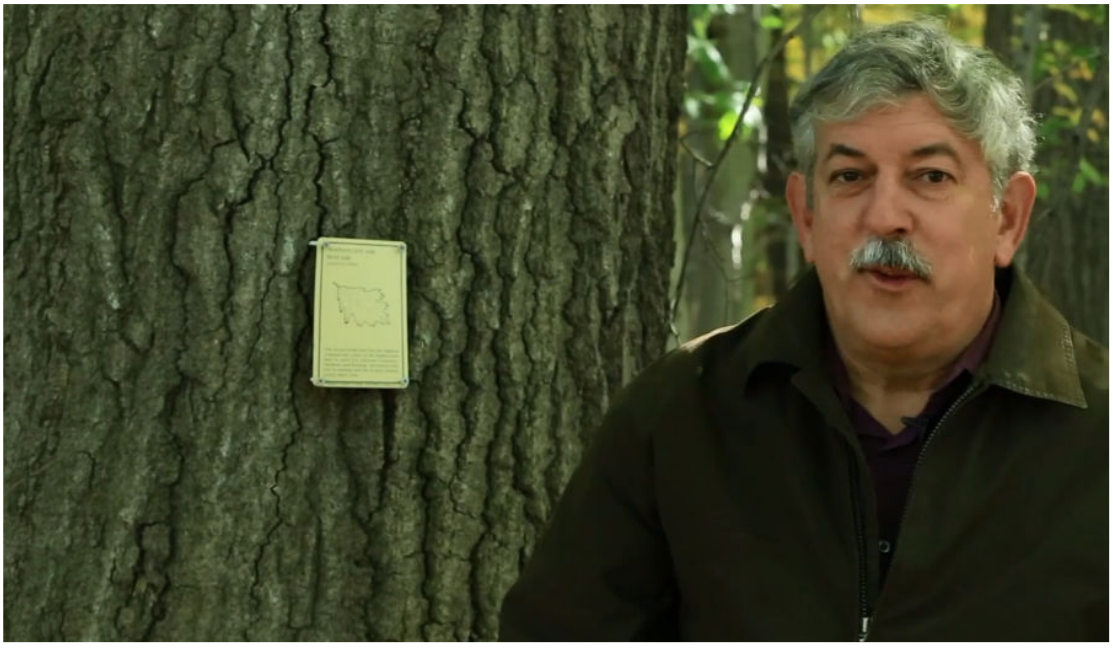
Old Growth Forests

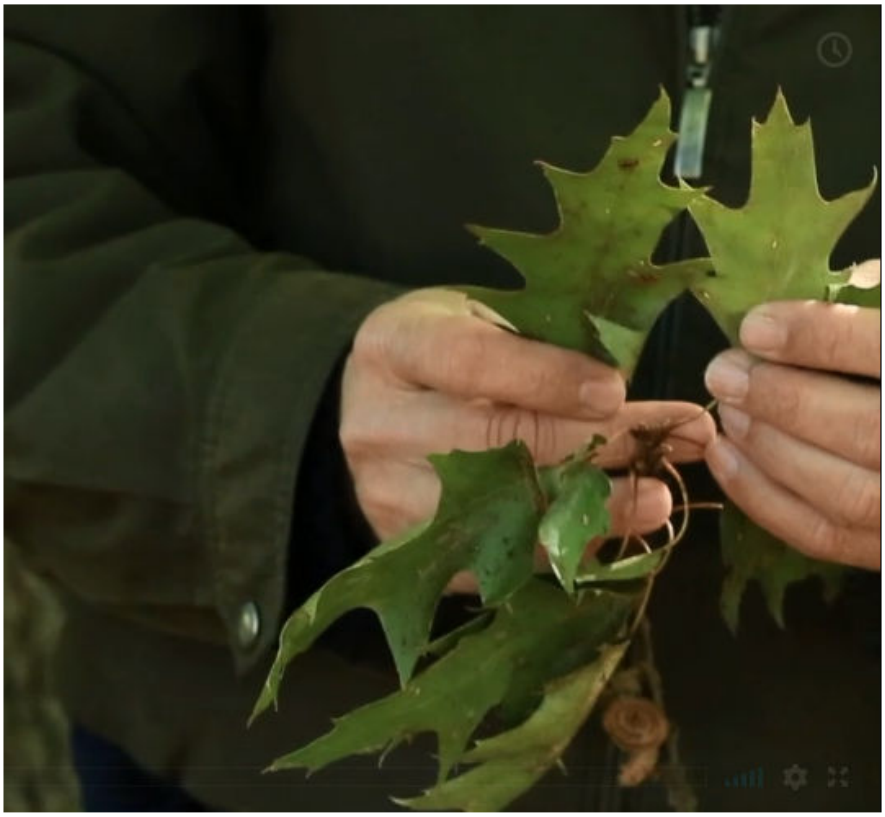
Smith Woods is a unique tract of old growth forest. Back in the Revolutionary War days they paid soldiers in 640 acre tracts of land, and this was part of one of those tracts. It was given to the Halsey family. They started to farm it like most of the people in the area, they cut down trees, put in mills, grew wheat and corn and all sorts of crops.

For some reason this 32 acre tract was not cut down; we don't know why. Most forests in NY State were cut at one time for logging; only about three tenths of a percent remain that are old growth, like they were when European colonists arrived. Although those little tracts of land exist around New York, they are mostly in places that are hard to get to and hard to log: places like gorges, ravines, and swampy areas. This tract is unique because it was not cut and it's very accessible. It's right along a major road between Ithaca and Trumansburg, it's flat and there's no reason why it couldn't be excellent farmland. Because of that a lot of the trees here grow to really large heights and sizes, and that's what unique about this forest.

Oaks

Among the largest and oldest trees in Smith Woods are Northern Red Oaks. These trees grow to be about 130 feet tall. This particular tree is probably about 200 years old [standing by tree with label]. You can tell Red Oaks from White Oaks because they Red Oaks have pointy leaves, whereas White Oaks, which are also in this forest, tend to have rounded leaves. Also, the bark of a Red Oak is a little bit darker than that of a White Oak and a little bit more riveted, and the tree form is a little bit more prostrate (horizontal) with the branches, whereas the branches of a White Oak are more upright. The acorns of a Red Oak are cherished by squirrels and deer, so often when you have lots of oak trees you find lots deer.





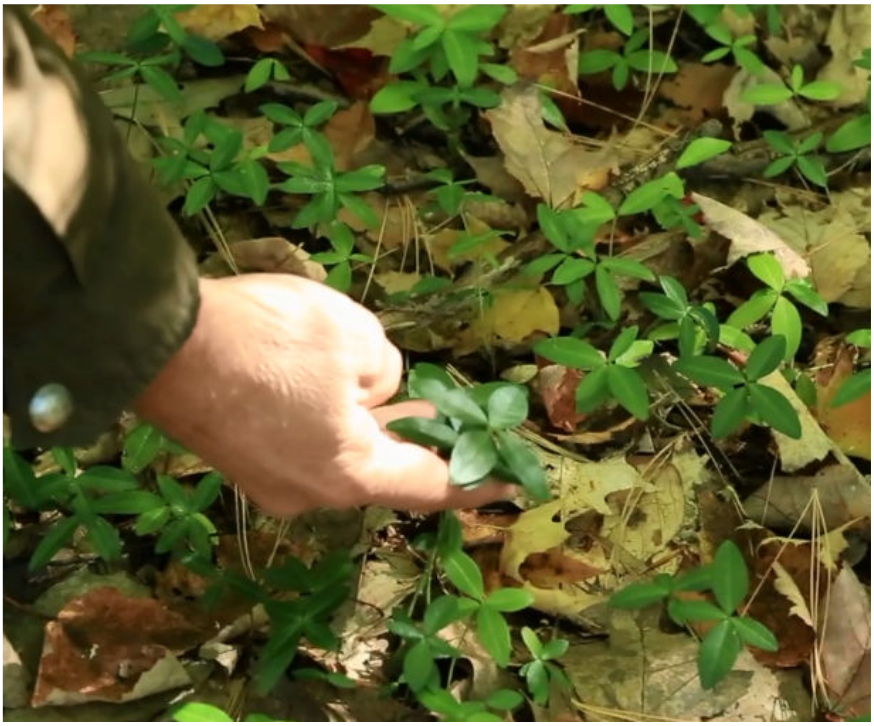
Red Oak leaves

Autumn leaf color

A lot of people assume that leaves turn color in the fall. Actually the chlorophyll that's already in the leaves, which is green, degrades in the sunlight when temperatures cool, leaving the colors exposed (anthocyanins and other pigments). The parts of the trees that are exposed to the most light will change color before the parts that are in the shade. You can see that really well in the forest in the fall because the lower trees and leaves lower in the canopy are still green where the top parts of the trees are turning color.

Invasive vinca

One of our management goals at Smith Woods is to maintain it in the state it was in over 300 years ago when the first colonists came. But we can't always be successful at that because there are some invasive species that we just can't control. At lot of them we can remove by hand, but others, like this vinca ground cover, are just too expensive to pull out by hand. Smith Woods is next to a cemetery, and it's likely that the plant, which is used as an ornamental ground cover often in cemeteries, was introduced into the Woods and has taken over. It's very shade tolerant and you can see it on parts of the forest floor.



Vinca

Beech trees

The dominant species in this forest are beech and maple. Beech trees are in decline right now because of an insect that burrows into the bark of a tree, creating a hole, and then a fungus grows in those little holes and girdles the tree, girdles the cambium layer, and the tree dies. When people carve their initials in trees, it gives more entry points for the insects. The insect that drills the hole is an introduced species that came to this country about 100 years ago. The fungus has always been here, but until the insect was introduced it couldn't gain access to the trees. Now unfortunately most of our beech trees are

declining and dying and we're not going to be left with big beech trees anymore. This is a real shame because it will change the composition of the forest.

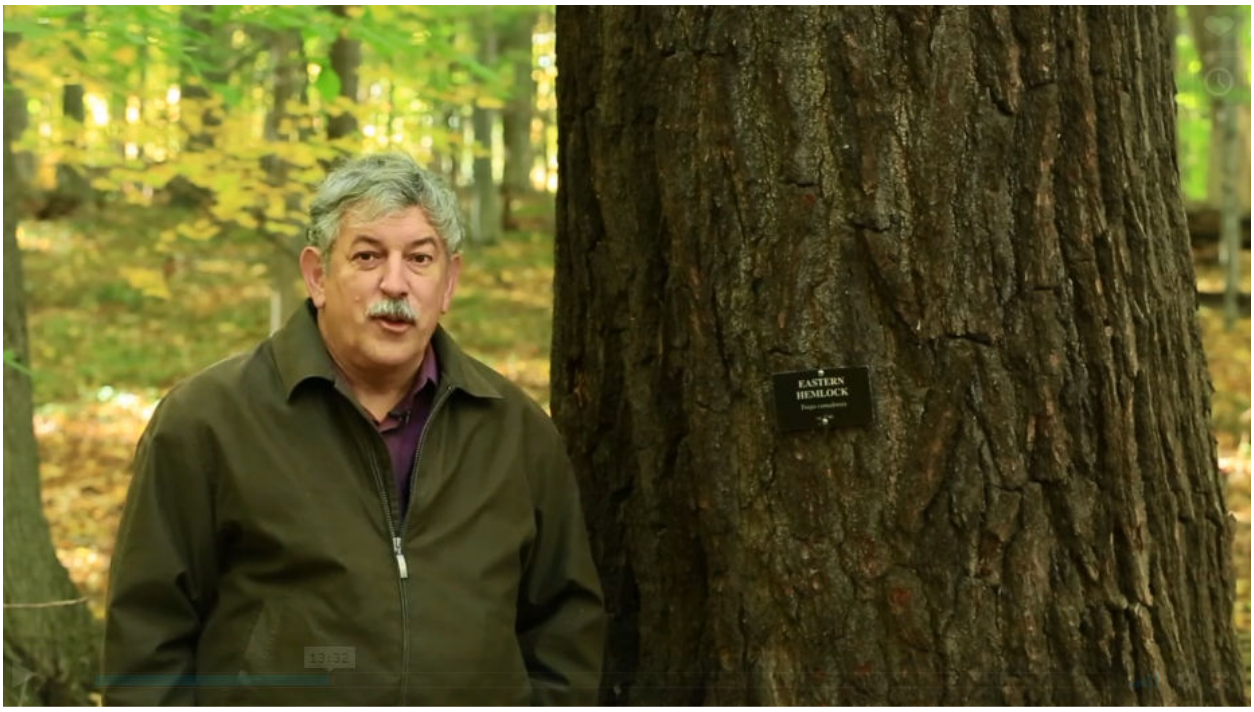
Beechdrop

This is an example of beechdrop, a saprophytic plant that lives on the roots of beech trees. It does not produce chlorophyll so it stays white. It produces flowers and seeds but it's white – when people see it they don't recognize it as a plant because it's not green and they think it's a fungus. But it's a plant and we have a lot of them here because of all the beech trees. The beech trees produce sugars through photosynthesis and the beechdrop lives off the sugars in the beech tree roots. When the beech trees die, this organism loses its food source and it will die, too.

Light requirements for growth

Most trees in the forest require high levels of light to germinate and grow, but there are some species that require only low levels of light. They are called shade-tolerant trees. Some examples are hemlock, beech, and maple, and it's not surprising that those trees end up being the dominant canopy species in a forest like this. On my left is a small, young, beech tree, and it grew in the shade when it was young. On my right is a small sugar maple. It grew in the shade when it was young. There are very few other species of that are small here. Most of the larger trees would have started growing when it was more light, and they grew to a large size. These trees, the beech and maple, will eventually dominate because they can get started growing in these low-light conditions.

Hemlock



Hemlock trees tend to be the longest lived trees in the eastern U.S. This eastern hemlock here is estimated to be about 300 years old. Some hemlocks in other parts of the eastern U.S. are estimated to be twice as old as this. Hemlocks are conifers; they grow very slowly. They are like the tortoise in the story of the tortoise and the hare. They keep growing slowly in the winter and they achieve a very large height and great ages.

Hemlock trees are also endangered by an invasive insect, the hemlock wooly adelgid, especially at low elevations. The insect sucks the sap out of the trees and causes defoliation. In the gorges around Cayuga Lake some of the hemlocks have already died. The farther North and higher elevation you go the less impacted the trees are, but we're starting to see the insect in this region. Probably in the next ten years the hemlocks in this region will be significantly impacted by this insect pest. This is another one of the main, dominant tree species we're losing from our forests in this area.

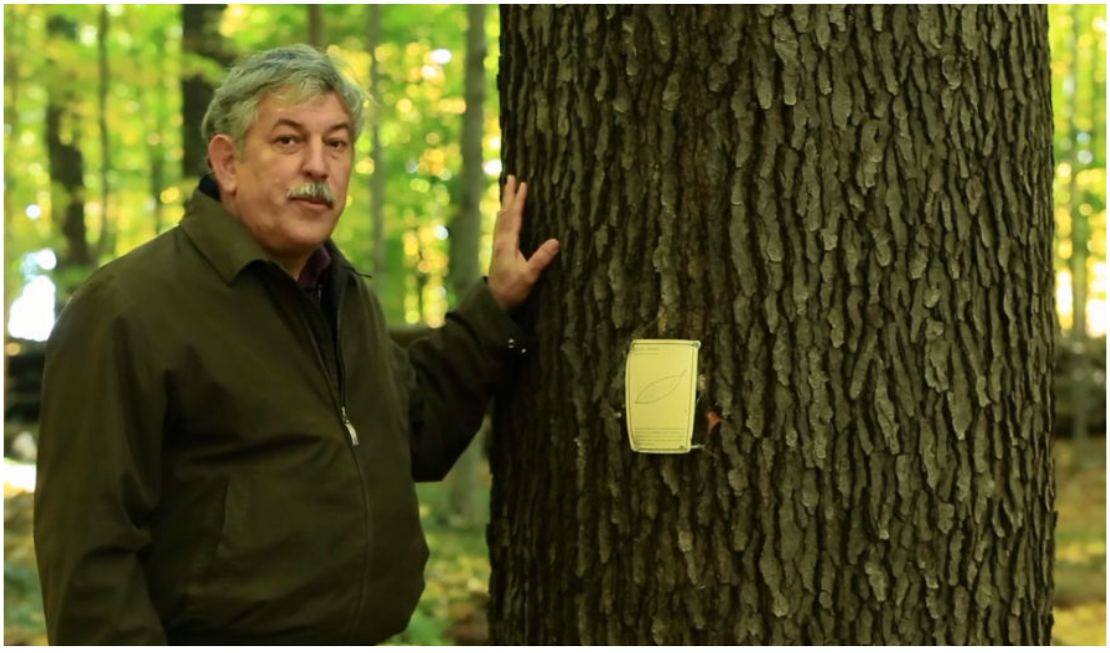
White Pine

White Pines used to dominate many of our forests about 100 years ago but they were mostly cut down to use for lumber because the wood is very rot-resistant and very straight, and it would make great ship masts. The perfect tree for shipbuilders. Most of the white pines were logged and then the government realized we needed to replant these trees because most had been cut down. In the 1930s the Civilian Conservation Corps planted white pines to bring them back. The problem was, by that time another invasive insect pest came in, and it would eat the tip of the white pine trees and destroy the growing

point. So instead of growing tall and straight they would be scrawny and stunted, and in this part of the world we have tracts of white pine trees that are short and stumpy looking. It's rare to see a white pine tree as straight and tall as some of the ones in Smith Woods.

Black Cherry

Black Cherries are extremely valuable as a lumber species, and it's rare to see ones as large, straight and tall as the ones in Smith Woods. A tree like this [standing next to cherry tree] if it's cut and sold would be worth several thousand dollars.



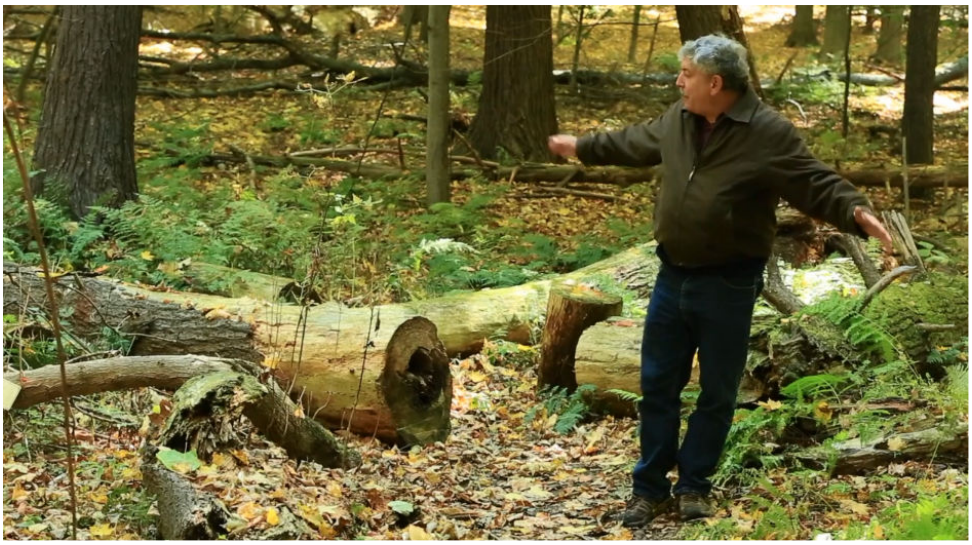
Yellow Poplar

There is a large grove of large, similar-sized yellow poplar trees (tulip trees) in a large circle here. We know that yellow poplar only grows well where there's light. We can deduce that where this large circle is, at one time there was a lot of light. These yellow poplars germinated and grew at the same time; almost all these trees are the same size and age, about 130 years old. What probably happened is a large tree fell over and created a light gap, or maybe there was a fire that opened things up and allowed light to come in. This allowed the yellow poplars to grow, and then when they grew large the area was shaded again and no more poplars could grow. We don't find young yellow poplar trees here because it's too shaded now.

Yellow poplars grow very quickly. Other trees that grow well in the shade grow more slowly. The large yellow poplar trees grew with light, and grew more quickly. Their wood is soft. The slower-growing trees have denser, harder wood.

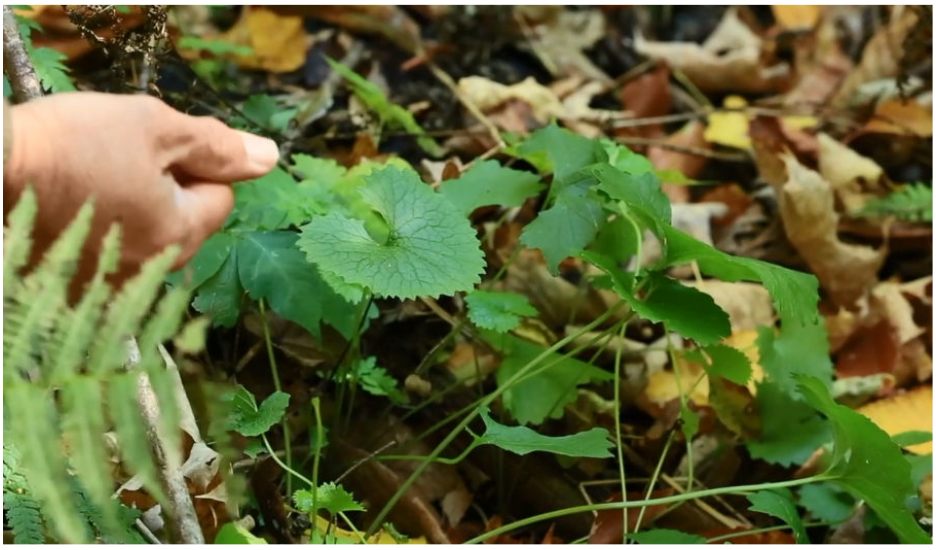
Other plant species in the forest

A lot of people assume that an old growth forest consists of nothing but old trees, but that's not really the case. There are old trees, but there are also trees that die, fall down, and open up light gaps and allow other light-loving species to come in. Here, in an area where a hemlock tree fell a few years ago and opened up a gap, we see a lot of ferns, box elder maple, elderberry, Jack in the Pulpit, impatiens. These are species we normally don't see in a typical shaded canopy. This might eventually be colonized by yellow poplar and black cherry, and then after they grow and create shade, sugar maple and beech will grow and eventually dominate. Then another tree falls somewhere else and the process repeats.



Yellow poplar seedling growing in a light gap.

Invasive plant species: garlic mustard



Most of our invasive plant species are light-loving plants. When a light gap opens up, we get concerned about invasives coming in, instead of the native species. An example is garlic mustard. It was introduced as an edible plant; it smells like garlic. It's very invasive and will colonize large areas along roadsides and in light gaps. When we see them, we pull them out…we pull garlic mustard in the spring.

Basswood

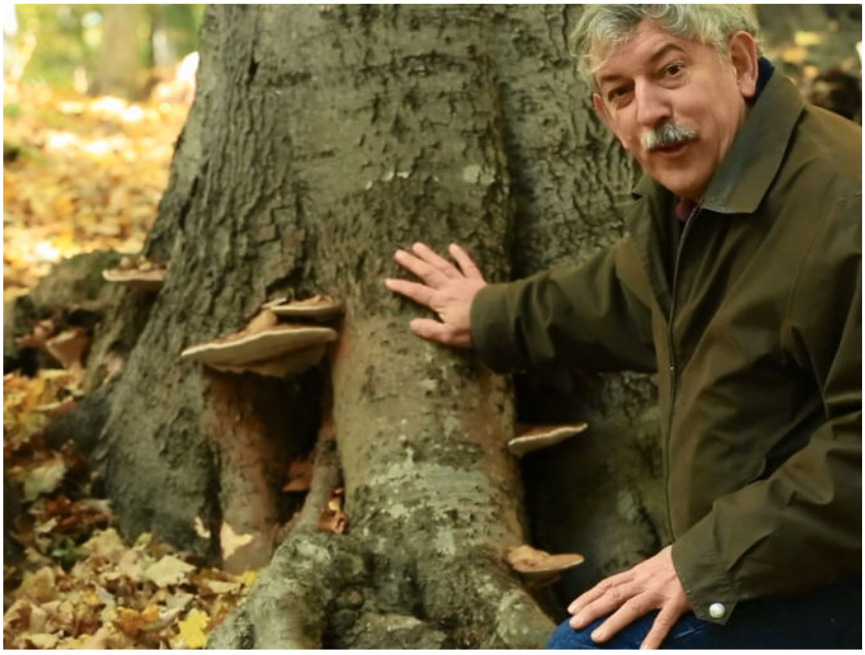
Basswood is another common tree species in our forest. It produces large, heart-shaped leaves and grows very tall. One distinctive feature is it often has branches coming off the base of the tree. It's an easy way to distinguish basswood from many other species.

Striped Maple

The scientific name of Striped maple is Acer pensylvanicum, and it's one of four maple species in Smith Woods. Something unique about them is that deer seem to love to rub their antlers along the base of these trees. Most of the striped maples in Smith Woods have damage from deer rubbing their antlers at the base.

Shelf fungi

They may be beautiful but it's not a good sign for the tree they grow on because they grow on dead and decaying wood. When you see them on a tree, it means the tree is not long for this Earth.



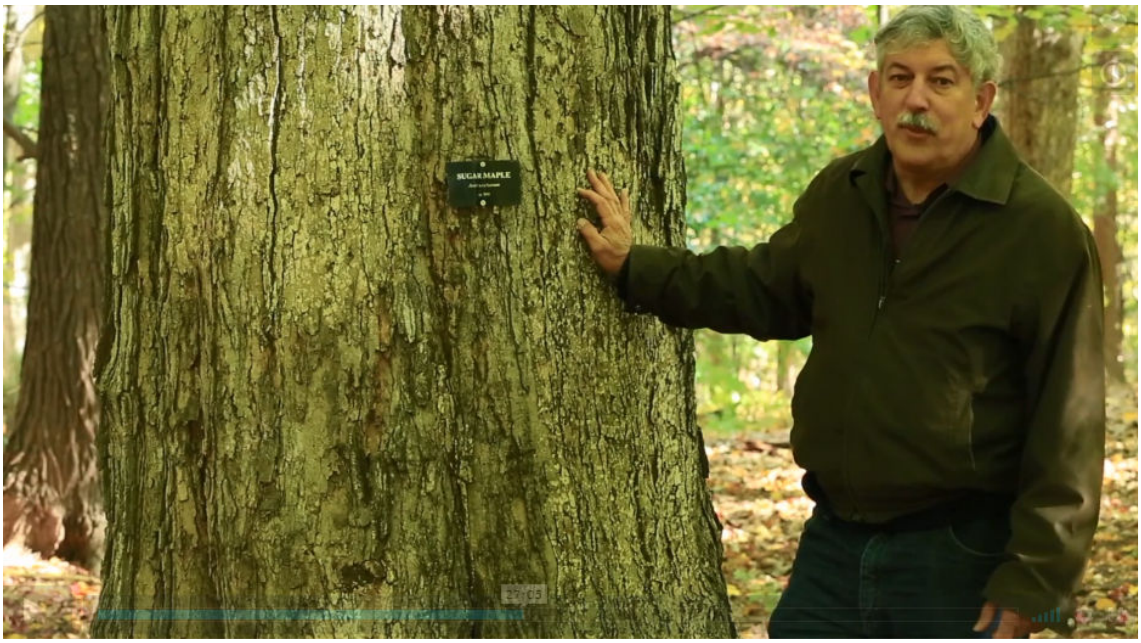
Black Birch

We often find Black Birch trees in Smith Woods with what appears to be their roots growing out of the ground and exposed. They often germinate on decaying logs or piles of soil that were turned up when another tree fell. When those mounds of soil or logs decompose, we're left with the roots which once grew on top of a log or soil still exposed growing seemingly in the air. This is fairly common with this particular species of birch.

Black birch produces a lovely flavor inside its bark. If you scrape away the bark and smell the inside, it smells like wintergreen. This is what people use to make birch beer. They peel the inner part of the bark, soak it in water, and use this to make a drink.

Sugar Maple

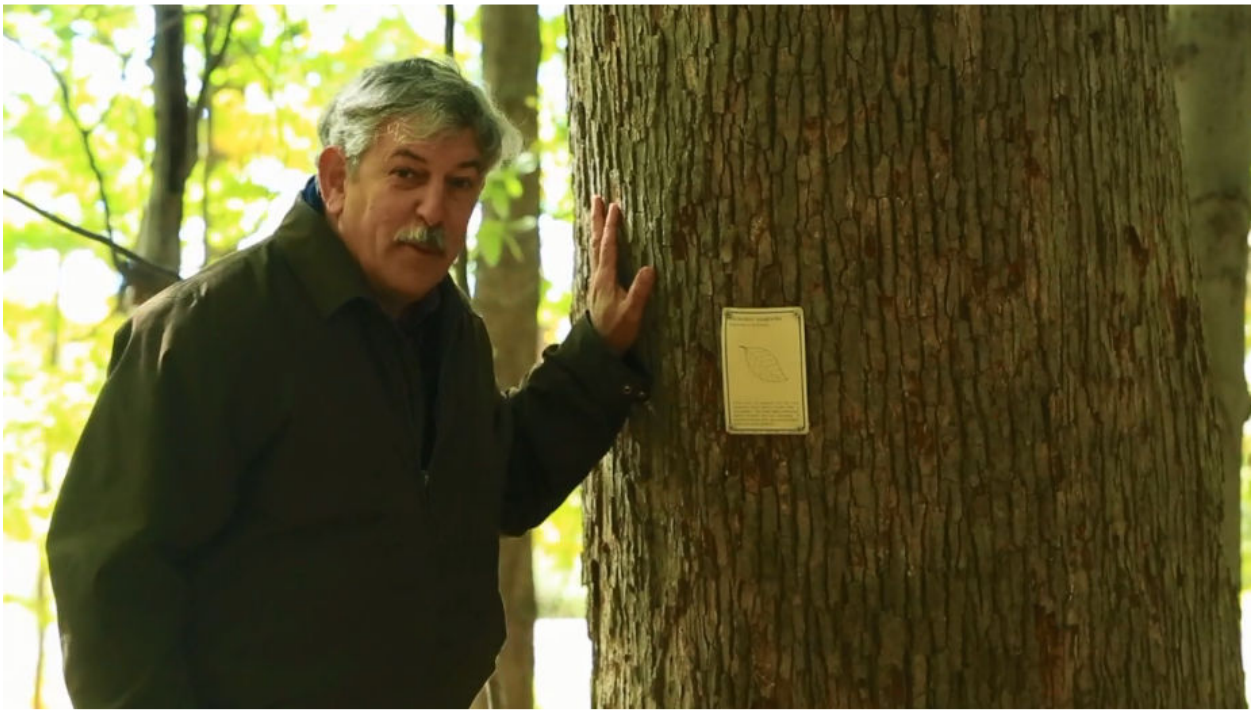
The sap from sugar maple is commonly used to make syrup and candy. The sap contains about 2% sugar, which is relatively high for trees. Other trees can be tapped as well – walnuts, birches – but sugar maple is the one with sap with the highest sugar content. These trees can grow fairly fast given light early on. This tree [standing next to marked sugar maple], even though it's quite large, is only about 130 years old, which means it probably grew in a fairly well-lighted situation early on to get to be this size. Many of the trees in towns around here are sugar maples and they don't live much beyond 160 - 170 years old so many are starting to die of natural causes. Cities and towns around here are starting to need to replace those trees with something else. This tree [standing next to marked sugar maple] is the largest sugar maple in Smith Woods, about 150 feet tall. A spectacular tree.



Oaks and deer

The oaks in Smith Woods aren't endangered by insects or disease, but the deer are grazing on the seedlings. When we fence Smith Woods to keep the deer out, we'll probably see oaks starting to come back.

Cucumber Magnolia



This is a magnolia tree, cucumber magnolia, and it's the largest tree of this species I've ever seen in this part of the world. It's typically a southern species – we're at the northern end of its range – but for some reason this lonely tree survived in this corner of Smith Woods and grew to enormous size and height.

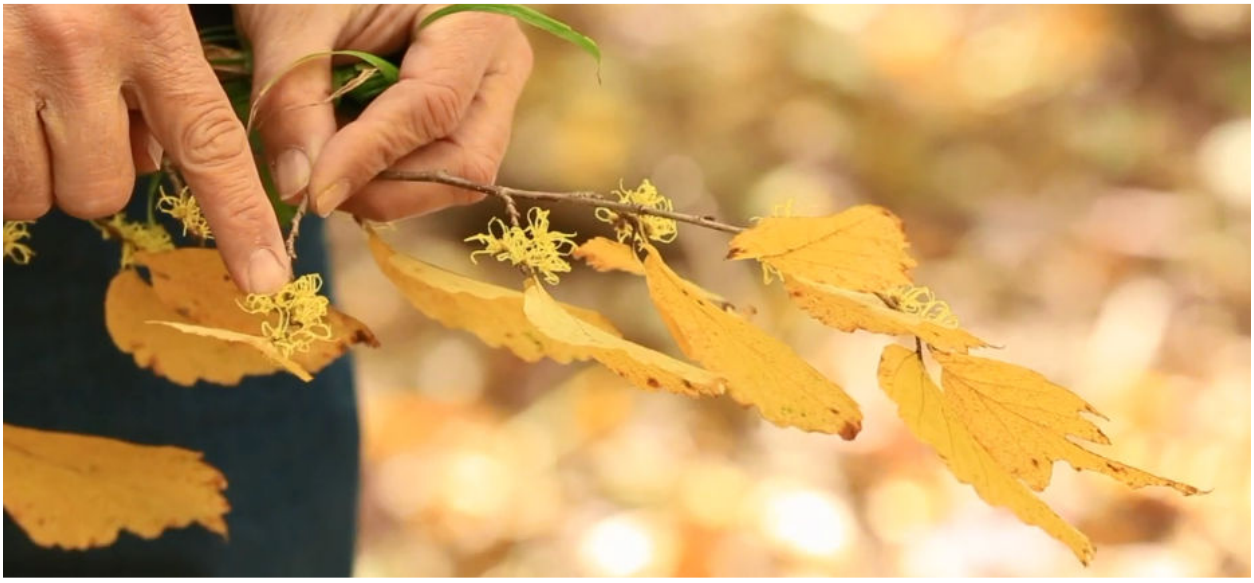
Wet, low-lying area of Smith Woods

We've walked down from a slightly higher elevation to a lower area, and it's wetter here. A lot of people would assume that because it's wetter there's more water for the trees to grow taller, but in fact the water in the soil keeps out the oxygen and the roots don't grow as well. The trees are smaller than those in the more dry, higher-elevation areas of Smith Woods, even though they might be the same age.

The other thing that happens is that the species mix changes completely from up above to down below. Here in the wetter area we're seeing white ash, white oak, pignut hickory, bitternut hickory, shagbark hickory, witch hazel, and none of those species occur up in higher ground.

Tree leaves and flowers

Red maple leaves have a slightly different shape than sugar maple leaves. Red maples prefer wetter areas. White oak leaves have rounded leaf margins. Witch hazel is one of the few plants that flower in the autumn. It will flower and set seed in the autumn, and those seeds will ripen in the springtime. It's the only tree that I know of that flowers in the fall.



Witch hazel flowering in autumn

Herbaceous plants

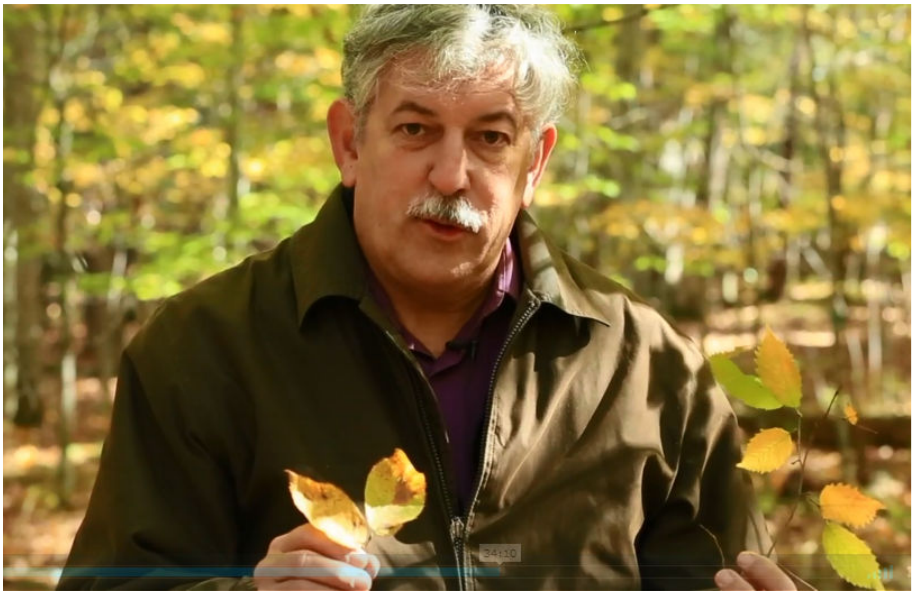
Christmas fern – it stays green in the winter; other ferns turn brown and die down in the fall.

Sedge – it looks like grass, is related to grass, but has a completely different ancestral line. Sedges have triangular stems – when you feel the base it feels like a triangle, whereas with grass the base is round. The reason you find sedges in this low-lying part of Smith Woods is because they have a high tolerance for wet soils. Many sedge species produce an oily substance on their seeds—the elaiosome—which ants will collect and bring to their nests. The ants will deposit the seed in the next area and eat the oily substance. The advantage for the sedge is that it gets its seed transported to a place often higher in nutrients and more well-aerated than solid ground. This is another example of an interesting co-evolutionary trait that happens in our forests.

White oak

In contrast to the red oak, it has whiter bark, not as indented, and its branches tend to be a lot more upright rather than prostrate. White oak trees often flare out at the bottom near the roots. The theory is this helps stabilize the trees in wet soil, so they don't tip over as much.

Ironwood

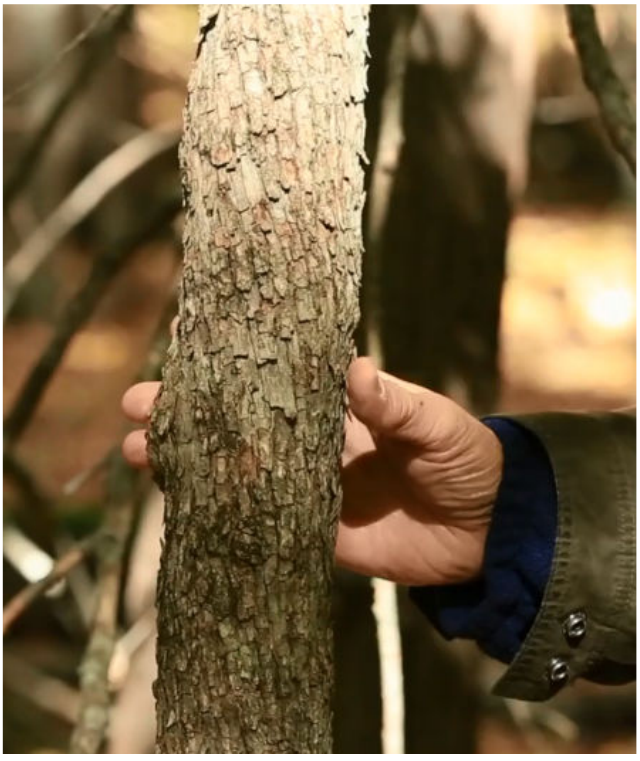


[Holding up two sets of leaves] This provides an example of why we use scientific names to identify trees. Two species are sometimes referred to as Ironwood, and also referred to as hornbeam. One is hophornbeam and one is American hornbeam, but there's a lot of confusion around those names. Instead we use the scientific names, Ostrya virginiana and Carpinus caroliniana, to distinguish the two.

The hophornbeam produces seed pods that look like hops, hence the name. In the fall after the seed pods have fallen, it can be difficult to distinguish between the leaves.

The bark is very different between the two species, however. Carpinus caroliniana, called Ironwood and also Musclewood because the bark looks like sinews of a muscle, has very smooth bark. The wood is very hard and is used to make hammer handles and axe handles. Ostrya virginiana has a very different looking bark, not smooth, but also has very hard wood.

Carpinus caroliniana (American hornbeam) bark

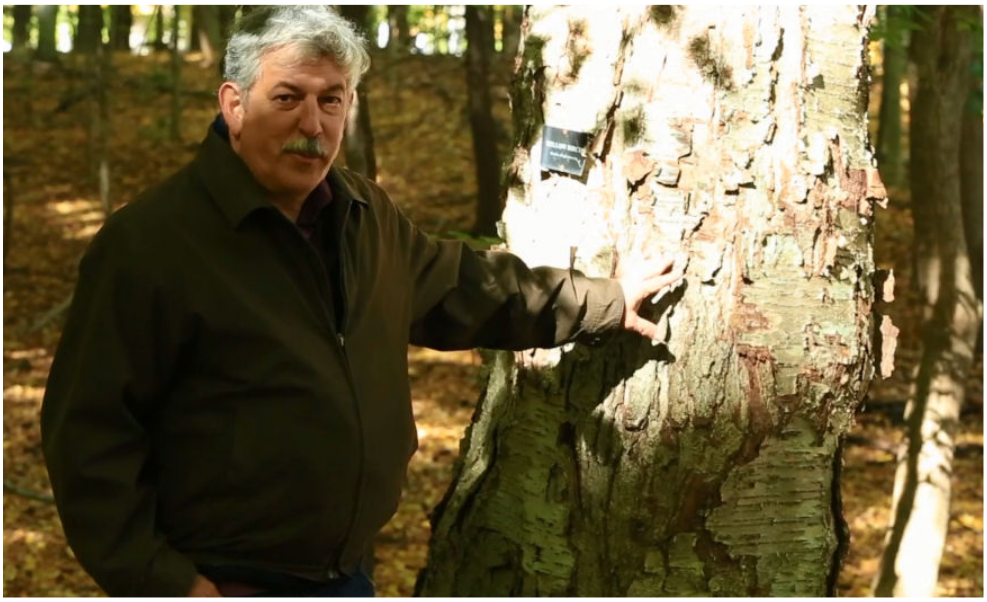


Ostrya virginiana (hophornbeam) bark

Mounds

One of the ways we can tell that this forest wasn't used for agricultural purposes is because it contains many turn-up or tip-up mounds, which are caused when a large trees falls and brings soil up with its roots. When the tree rots a mound of soil is left behind. There are many of these in Smith Woods, the key indicator that this area was not logged or used for agriculture.

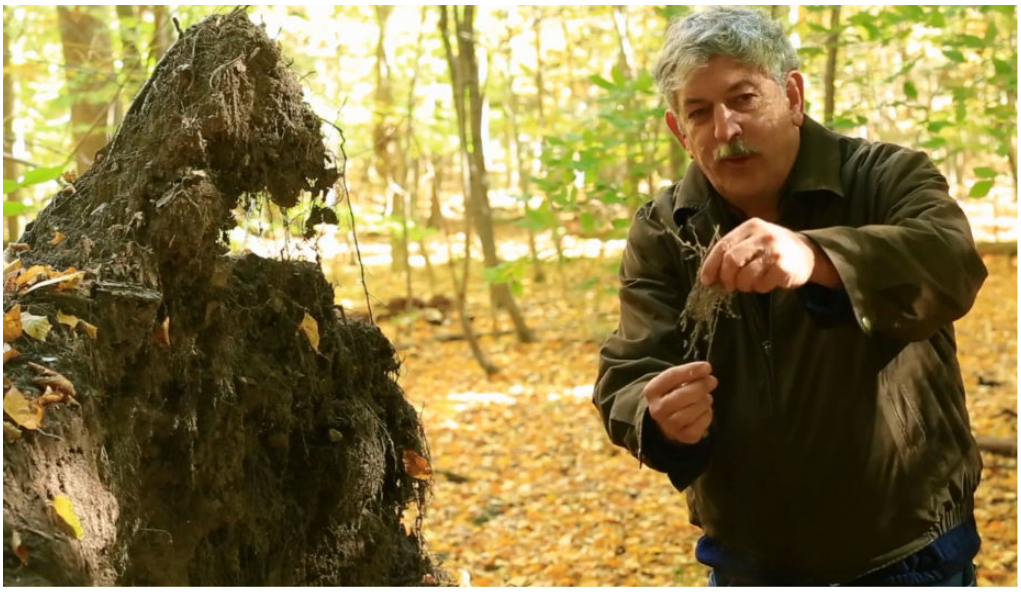
Yellow Birch



Yellow birch can be distinguished from Black birch because it has much lighter bark and flakier, scalier bark. Also, it tends to grow along places where water seeps out of the side of a bank of hillside. Right along that seepage line is where we often find Yellow birch, and this is the case here in Smith Woods.

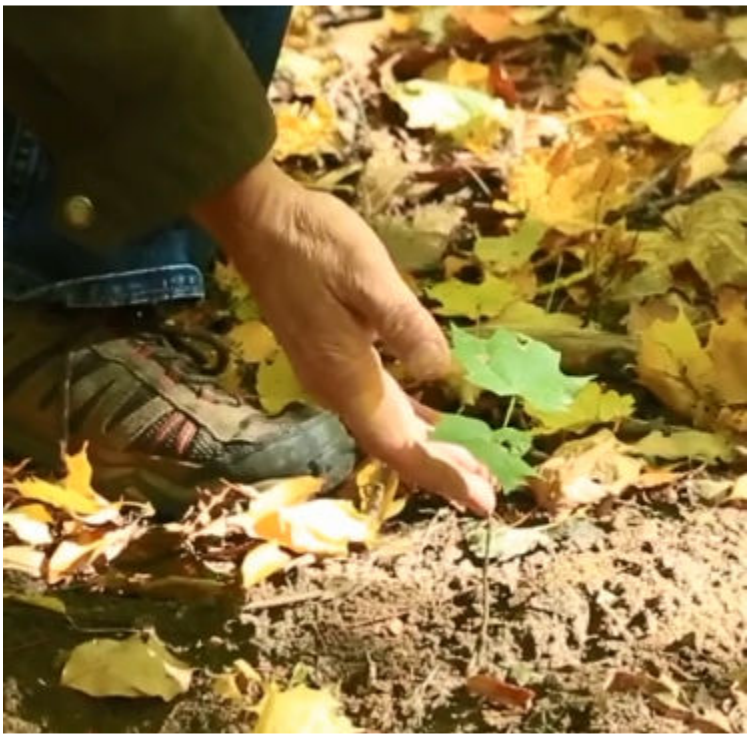
Fallen tree, tree roots

[Standing by a beech tree that has recently fallen] A lot of people assume that trees have very deep tap roots, but that's not the case. This fallen tree is a good example of the root system of a typical beech tree, growing in a somewhat wet area. The roots aren't deep at all, maybe only a foot into the ground. When it rains and the soil gets saturated it's easy for these trees to tip over, creating tip-up mounds. Underneath these trees you have fine roots, as opposed to very deep tap roots.



Impact of deer

One of the things we don't see in Smith Woods and we wish we would see is small trees, little saplings. The reason we don't see them is because of deer pressure, which is quite heavy. The deer browse on young tree seedlings, before they have a chance to get started. Here is a maple seedling; walking around it's uncommon to see a seedling like this because most have been eaten. Chances are this seedling will be eaten by deer within the next year, too, and it will never have the chance to reach full height.



Purple swallow wort

Swallow wort is an invasive plant that we're starting to see more and more of in this area. It's moving into Smith Woods and we'll have to try to eradicate it. It's related to milkweed and it's extremely difficult to pull – it has a very deep root system. We're concerned about it moving into this area.

Tree growth

Trees grow concentrically: they put a new layer of growth on the outside of last year's growth. The youngest part of the tree is on the outside and the oldest part is on the inside. A lot of people assume that trees are solid all the way through and while that's true for younger trees, the center of older trees often rots. The outsides of older trees are still living and the trees still grow. When old trees die and fall over we can often see that their insides are completely hollow. Only the outer layer of the tree lived and supported the rest of the tree. The insides are often places where fungi get started in the dead wood. They work their way out and eventually cause the tree to fall over or rot.