Cornell University Cooperative Extension

Forest Connect

Supporting Sustainable Management of Private Woodlands

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# Doubly-serrate margins, and these trees all look alike as seedlings and saplings

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The genera and species of the birch family (Betulaceae) can look quite similar for many of their features. Most people are familiar with the papery white bark of paper birch, but there are several trees, a couple sub-canopy trees and shrubs in this family. Fortunately there are several features that can help in the differentiation of genera and species. When the key features are present, they are readily distinguishable. A great resource for identification of trees of the Northeast is *Trees of New York State, Native and Naturalized* by Dr. Donald J. Leopold of SUNY ESF, published by Syracuse University Press.

The birch family includes four genera that are found within New York. These include *Betula* (birches), *Carpinus caroliniana* (American hornbeam, blue beech, musclewood), *Corylus* (hazelnut), and *Ostrya virginiana* (eastern hophornbeam, ironwood). All the birches can attain tree-size and occupy a canopy position, although gray birch (*B. populifolia*) is of generally small-stature, less common, and found largely in areas with disturbed and low fertility soils. Hazelnut is a shrub that includes two species: *C. americana* (American hazelnut) and *C. cornuta ssp. cornuta* (beaked hazelnut). The focus here will be on the common tree species.

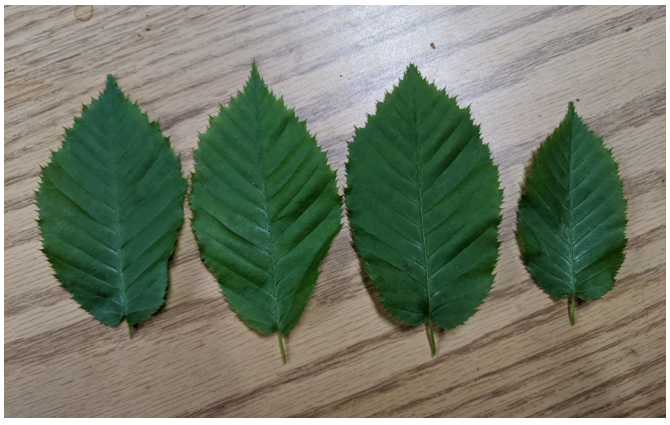

Figure 1: Any leaf with doubly serrate leaf margins, thus patterns of intermixed large and small teeth, is in the birch family among one of four genera.

Figure 2: Immature (paired) nutlet with bract of American hornbeam. Other species of the family typically not paired.

The birch family has some common features that differentiate it from other trees. The most notable feature across all genera is the presence of a doubly serrate leaf margin (Figure 1). Another feature is the small hard seed (i.e., nutlet) that is wind-borne by a leafy bract whose shape and size depends on the genus (Figure 2).

### *Betula* spp.

The birch genus, Betula, has three common species in NY, all tree form. These include paper or white birch (*B. papyrifera*), black or sweet birch (*B. lenta*), and yellow or bronze birch (*B. alleghaniensis,* AKA *B. lutea*). Paper birch, of the three, lacks an aroma of wintergreen that is present for both yellow and sweet birch. Paper birch has the classic "papery" bark (Figure 3) that starts as a smooth brownish bark typical of all juvenile stems of *Betula, Ostrya* and *Carpinus.*

Another feature common to the birch genus is the formation of spur or short shoots (Figure 4). Some buds that might otherwise elongate into a twig are stunted to about a 1/16th inch yet produce two leaves. Because the leaves are compressed onto a nonelongated twig they appear paired. This pair of leaves are differentiated from opposite foliage (such as occurs for ash or maple) because there is only a single bud associated with two leaves.

The fruit of the birches is a strobilus, which is shaped as a cylinder with tapered ends that looks something like a small and not so woody pine cone. The strobili of yellow and sweet birch are upright, known as erect, and lacking a stalk, known as sessile (Figure 5). The strobili of paper birch are pendant and with a stalk, thus pedunculate. The seeds of all birch are quite small, winged and disperse widely in the wind and on the surface of the snow. The ease and success of seed dispersal creates a reputation for the genus that is comically proclaimed that one tree per county can provide adequate seed for reforestation.

Birch bark is a classic visualization associated with paper birch, but the exfoliation occurs to some extent on all species (Figure 3). The common names of white, yellow and black reflect the color of the bark. Black birch bark (Figure 6) is less exfoliating, dissects into plates, and thicker than paper or yellow birch.

Paper birch leaves are broader at the base than yellow or sweet birch, which taper from the widest point. Paper birch leaves also have fewer than 9 lateral veins (Figure 7a). Yellow and sweet birch leaves are similar (Figures 7b, 7c), including hairy petioles, and bas-

Figure 3: The term "birch bark" is almost synonymous with the visual image of paper birch. As the stem matures the bark whitens and begins to exfoliate, or peel.

Figure 4: Spur shoots form when lateral buds fail, for whatever reason, to fully elongate. The leaves that would have developed on that twig are compressed to a pair.

Figure 5: Pictured is a strobilus of yellow birch. The strobili of yellow and sweet birch are upright, known as erect. In contrast, paper birch strobili are pendant.

es that are rounded, heart-shaped, and sometimes asymmetrical. However, yellow birch leaves have hairs on the veins of the lower surface and may be somewhat, though indistinguishably, narrower than the leaves of sweet birch. The buds of birch twigs pull away from the twig, thus are divergent. As with the foliage, twigs of yellow and sweet birch have a smell of wintergreen. The buds of all three may occur on short or spur shoots, though these short shoots may elongate after multiple years of compressed growth.

Figure 6: Black birch bark on pole-sized stems appears to exfoliate, but as the tree matures the bark develops plates.

### *Ostrya virginiana* and *Carpinus caroliniana*

*Ostrya* has only one species in the Northeast and is known commonly as eastern hophornbeam or ironwood. The former name is attributable to the fruit that looks like a hop, and the latter is to the density of the wood that was used in the textile industry as spools or turned on a lathe for mallets. This species is most likely to be confused with American hornbeam. Here, reference to each will be by genus.

Figure 7b: Paper birch leaves are broader at the base, more coarsely toothed, and have 9 or fewer lateral veins.

Figure 7b: Sweet birch leaves on spur shoots

Figure 7c: Yellow birch leaves which are similar to sweet birch leaves.

*Ostrya* and *Carpinus* do not form spur shoots. On lateral branches there is often a variety of leaf sizes (Figure 8). The leaves of *Ostrya* are finely hairy on the upper surface, but their petiole (the stalk of the leaf) is reported as without hairs, thus glabrous. *Carpinus* has similarly sized and shaped leaves as *Ostrya*, but the petiole is hairy and the upper surface of the leaf is glabrous to the point of feeling like wax paper (Figure 9). The leaves of both species are thin and delicate. The veins of *Ostrya* foliage may often be branches, though this is unlikely on the veins of *Carpinus* foliage.

The twigs of *Ostrya* are fine, though stouter than *Carpinus*. The buds of *Ostrya* are ¼ inch compared to the 1/8 inch buds of *Carpinus*. The buds of *Ostrya* are also more substantively divergent versus the minimally divergent or appressed buds of *Carpinus*. If you use a hand lens, you may see vertical striations on the bud scales of *Ostrya*, but not on the bud scales of *Carpinus*.

The mature bark of each is readily distinguishable. The bark of *Ostrya* is finely shredded and pealing (Figure 8). The bark of *Carpinus* is smooth, bluish, tight and fluted to look like the separations of a well-formed muscle, thus the common names "blue beech" and "musclewood".

The fruit of *Carpinus* is a paired nutlet with lobed bracts (Figure 2). The fruit of *Ostrya* is a single nutlet encased in an oval wing.

Finally, *Ostrya* is more likely to be found growing on drier soils, and *Carpinus* is more likely to grow in moist soils or near streams. Both are tolerant of shade, but will prolifically stump sprout if cut. The name "water beech" reflect the common streamside and moist soil habitat for

*Carpinus* though it is not typically found in standing water.

**Summary of key features:**

- Paper birch (*Betula papyrifera*) – white papery exfoliating bark, spur shoots possible, non-aromatic twigs, 9 or fewer veins on foliage that is broadest at the base and coarsely doubly serrate margin. Leaf base may be rounded or symmetrically flat on either side of the petiole. Buds are divergent.
- Sweet birch (*Betula lenta*) – black bark with plates, spur shoots possible, wintergreen aroma of twigs and foliage, typically more than 9 veins on foliage, doubly serrate with small serrations. Leaf tapers from mid-point of leaf towards base, which may be asymmetrical and cordate (heart shaped). Petioles are hairy. Veins on lower leaf surface without hairs. Buds are divergent.
- Yellow birch (*Betula alleghaniensis*) – yellow or bronze papery and exfoliating bark though large diameter mature trees develop plates. Foliage may occur on spur shoots and with twigs have aroma of wintergreen. Leaf tapers from mid-point of leaf towards base, which may be asymmetrical and cordate. More than 9 veins on foliage, doubly serrate with small serrations. Petioles are hairy. Hairs on veins of lower leaf. Less common on dry sites, more common in cool habitats and soils with adequate moisture.
- Eastern hophornbeam (*Ostrya virginiana*) – finely shredded bark, fine double serrations on delicate leaves with often branched veins, asymmetrical leaf base, leaves of various sizes, fine hairs on upper surface of leaf apparent to the touch, unlobed wing encasing single nutlet fruit, vertical striations scales of on ¼ inch green-brown divergent bud.

Figure 8: The foliage and bark of eastern hophornbeam, also known as ironwood. Veins of foliage may be branched (evident in this picture), and the leaf surface is delicately pubescent to the touch.

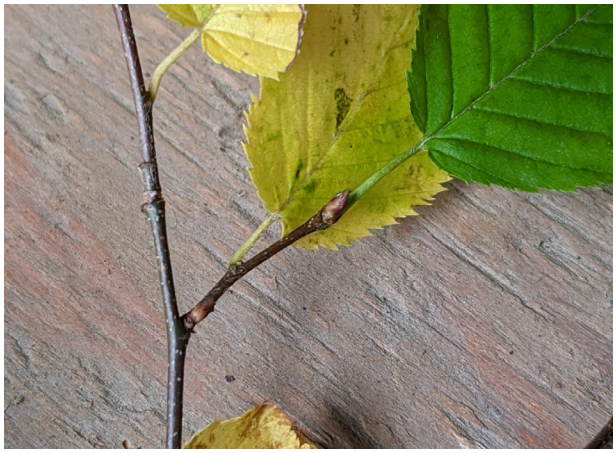

Figure 9: The foliage of American hornbeam is visually similar to eastern hophornbeam, though lacks branched veins and in this figure suggests a glabrous leaf surface. Smaller buds, more appressed to the stem.

- American hornbeam (*Carpinus caroliniana*)– smooth bluish fluted bark, fine double serrations on delicate leaves that lack branched veins, asymmetrical leaf base, leaves of various sizes, glabrous upper surface of leaf, lobed wing encasing double nutlet fruit, smooth scales on 1/8 inch brown slightly appressed bud.

For additional information on woodland management go to:
www.ForestConnect.com & www.CornellForestConnect.ning.com

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