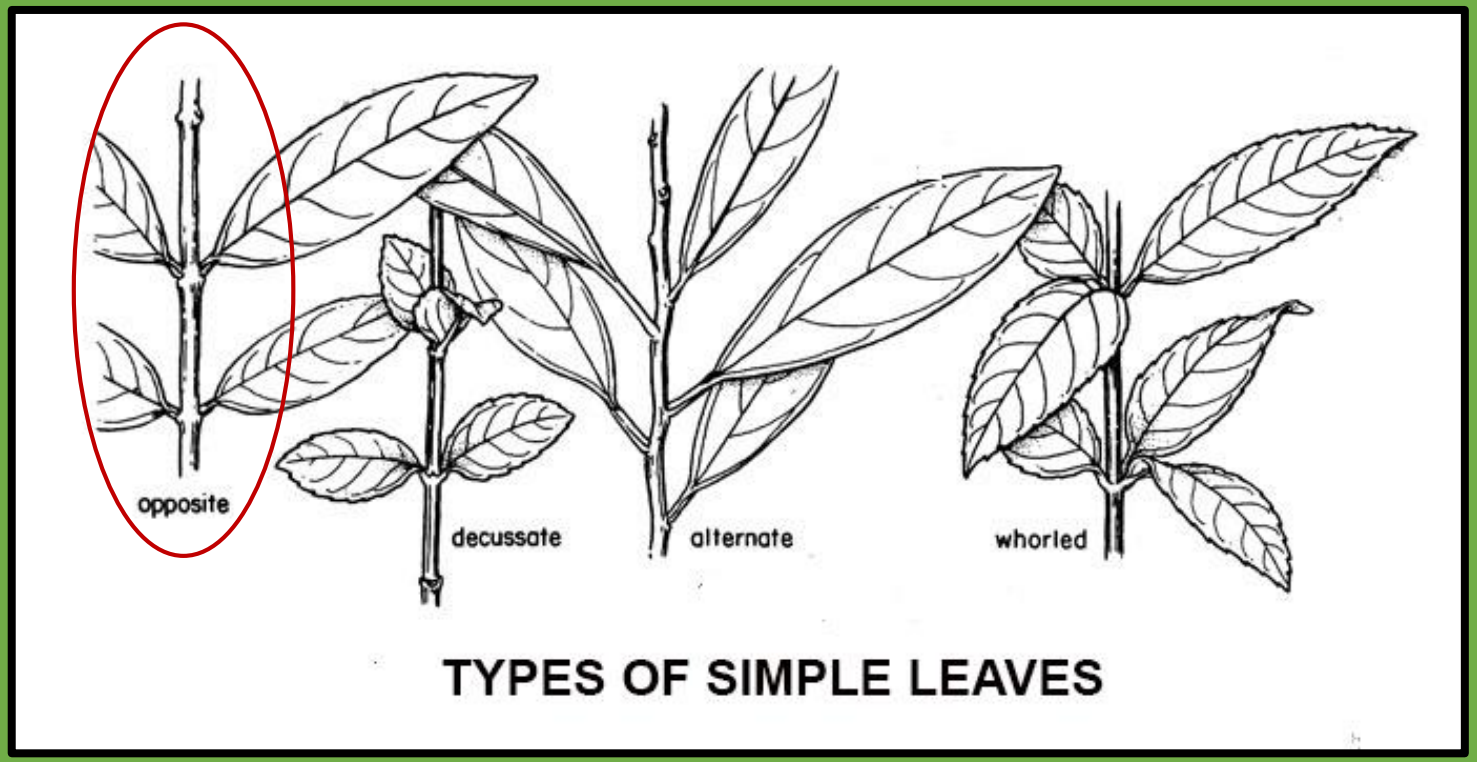
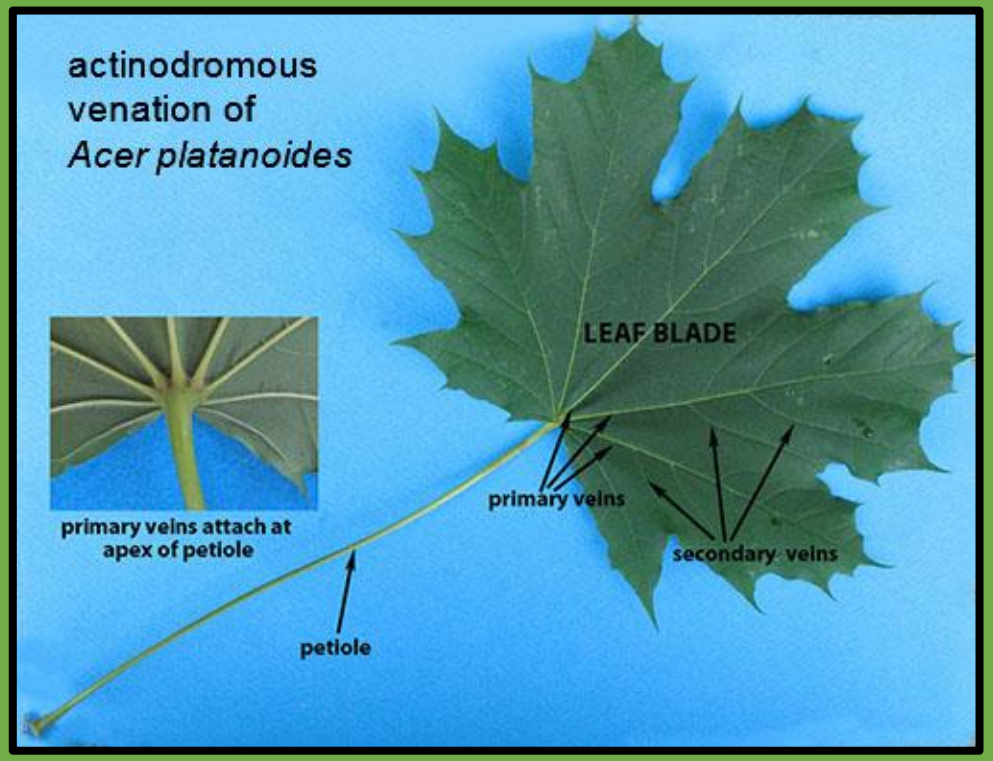
SPECIES OF TREES WITH OPPOSITE SIMPLE LEAVES IN THE PRESERVE

S. A. Mori, M. Rothman & R. F. Naczi
Last updated: 27 March 2018



In this essay we make it possible to identify a tree species that has opposite simple leaves. We have documented only four species with this leaf type in the Preserve, three species of maple (*Acer*) and one species of dogwood (*Cornus*). We also include *Cornus alternifolia* because it's leaves are alternate but often interpreted as opposite.

IDENTIFICATION OF MAPLE SPECIES



Acer is a genus of about 150 species worldwide. There are approximately 14 native species in eastern North America (Nelson et al., 2014).

In the recent past, maples were placed in the Aceraceae but the Angiosperm Phylogeny Group now treats them as belonging to the Sapindaceae (Stevens, 2018 accessed). Most species are easily recognized by their opposite, simple leaves; actinodromous venation; and winged fruits called samaras. Species of maple are one of the most commonly planted ornamental trees, a source of fine grained wood used for making furniture, veneer, and flooring; and the sap is used for making maple syrup. There are three species in the Preserve.

A KEY TO THE THREE SPECIES OF MAPLE DOCUMENTED IN THE PRESERVE

1. Leaf blades usually with 3 lobes (sometimes with 2 additional obscure lower lobes), the margins of the leaf-blade lobes toothed. Flowers usually red. Young samaras usually red. Fall foliage brilliant red. Prefers damp habitats.....*Acer rubrum*

1. Leaf blades with at least 5 lobes (including smaller ones at base), the margins of leaf-blade lobes entire. Flowers greenish-yellow. Immature samaras usually green. Fall foliage yellow to red. Prefers dryer habitats.....2

2. Cut petioles often exude whitish latex. Leaf blades with 7 lobes. Samaras 3-4 cm long, the wings widely spreading. Fall foliage yellow.....*A. platanoides*

2. Cut petioles without whitish latex. Leaf blades with 5 lobes. Samaras 1.5-3 cm long, the wings usually parallel to one another. Fall foliage yellow to orange.....*A. saccharum*

Note: Plant characters are variable. For example, the red maple often has three-lobed leaves but sometimes there are two basal lobes that make the leaf 5-lobed; thus, look at a broad sample. In addition, look at more than one character before making a decision. Sometimes a character, such as petiole latex, might not be present because of a long period of drought.

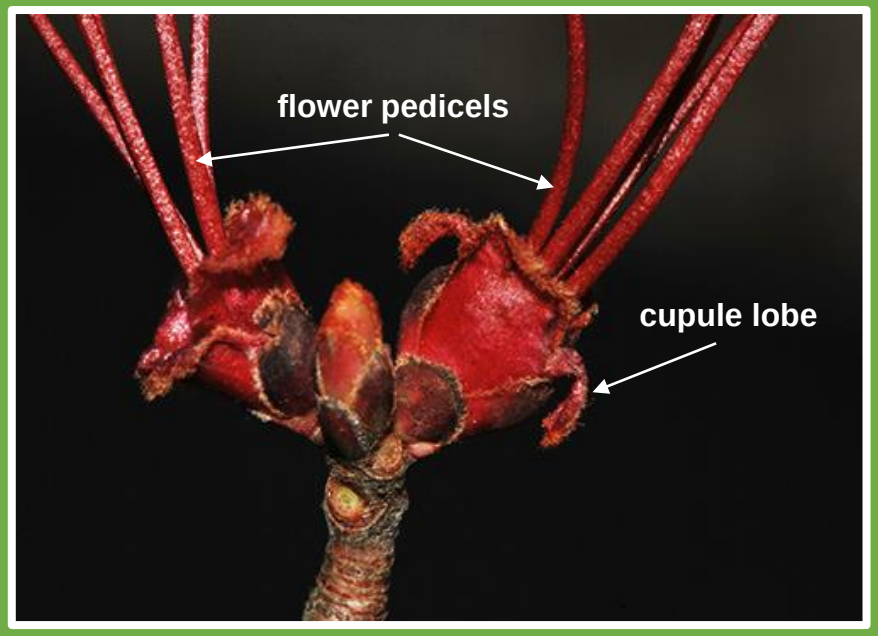
BARK AND LEAF CHARACTERS OF RED MAPLE (*Acer rubrum*)

The bark of this species is nearly smooth when young, develops shallow fissures when mature, and often appears flaky when very old. The leaves have three to five lobes but the lower two lobes are poorly developed or absent. The margins of the leaf blades are toothed. Of the three species in the Preserve this has the smallest leaves This species prefers moist soils, is one of the first to flower in the spring, and is the first to change its leaf color to a brilliant red. In addition to red leaves, the flowers are usually red but infrequently they are yellow.

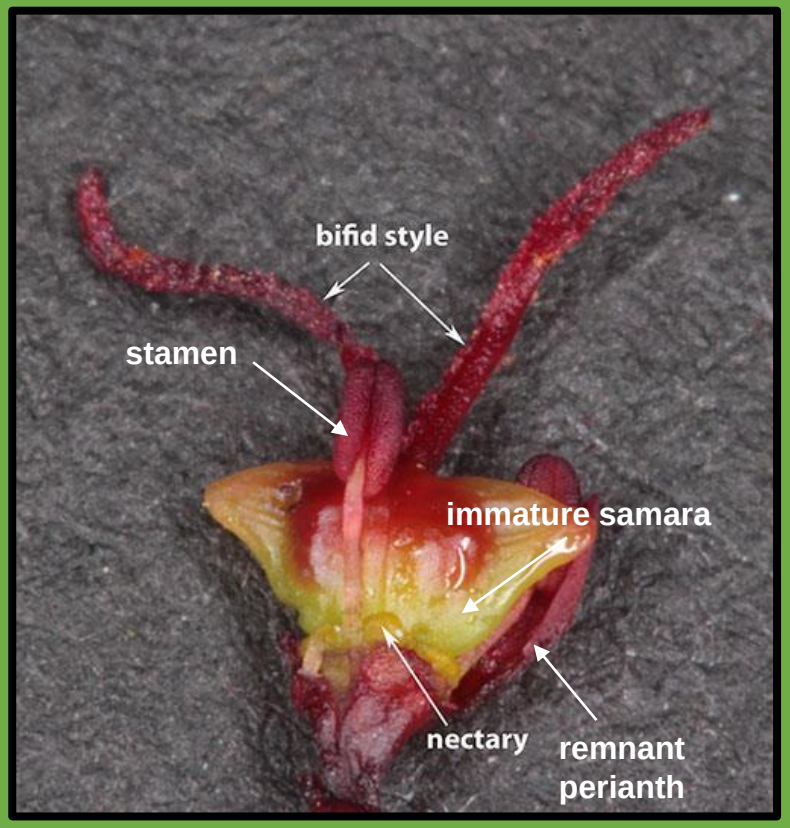
INFLORESCENCE AND FLOWERS OF RED MAPLE (*Acer rubrum*)

The flowers are bisexual and are placed in fascicles that arise from within cupules derived from bud scales. The sepals and petals are so similar that they can only be recognized by their placement, the former on the outside and the latter on the inside. The style is bifid all of its length.

FLOWER CHARACTERS OF RED MAPLE (*Acer rubrum*)



Acer rubrum is among the earliest tree species to flower in the Preserve. The flowers appear just before the leaves flush. Male flowers, bisexual flowers, and female flowers can be found on the same tree in different combinations. The flowers are usually pollinated by wind before leaves appear; makes it easier for pollen to reach the stigma. Note that the bud scales subtend a cupule of fused bud scales. The cupule is shortly lobed. The lobes are reflexed and densely pubescent at the apices.



A dissected bisexual flower with most of the perianth and 4 other stamens removed. The arrow indicates what appears to be a nectary which produces nectar sought after by insects, indicating that this species may be pollinated by both the wind and insects. On the other hand the nectary-like structure may be vestigial and not produce nectar.

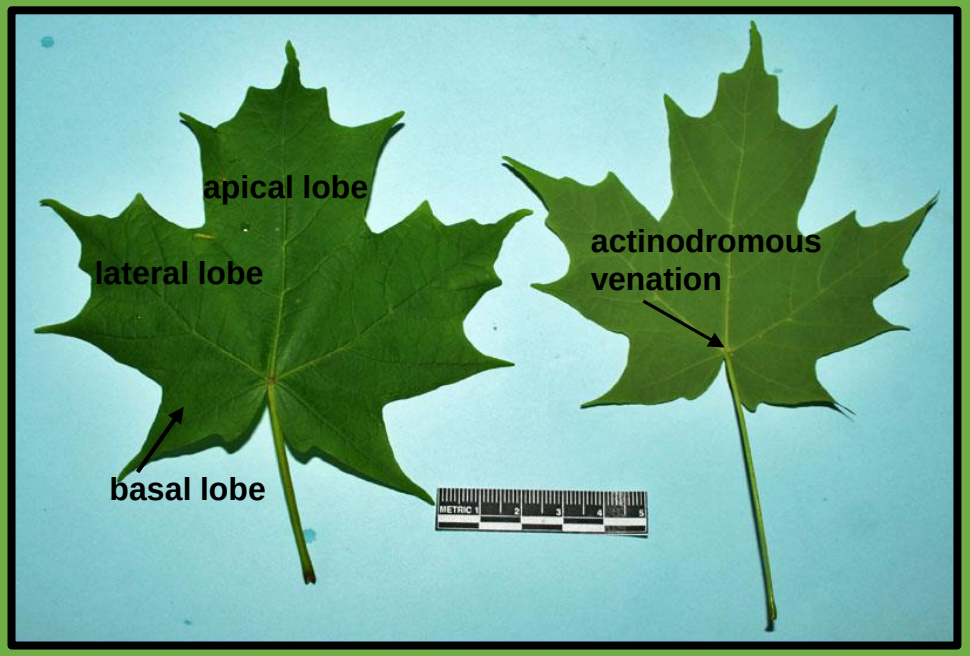
FRUITS OF RED MAPLE (*Acer rubrum*)

Immature fruits of this species are often tinged red. At this stage of development the two samaras are parallel and close to one another.

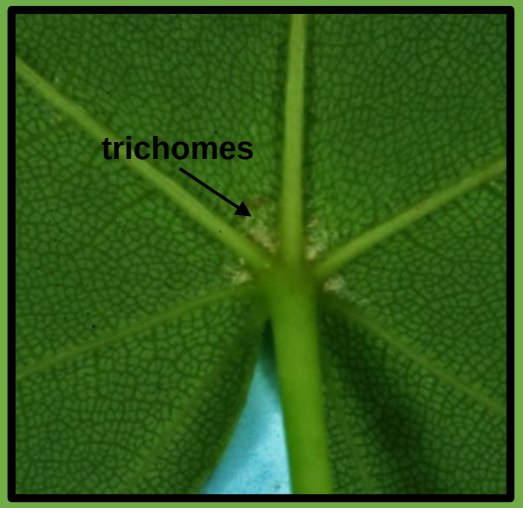
The fruits of this and other species of *Acer* are derived from a bilocular, superior ovary. The samara is defined differently by different botanists as follows: 1) both segments of the fruit together are called a double samara, 2) others call each segment a samara, or 3) each segment is called a mericarp and the two of them together are called double samaras.

BARK AND LEAF CHARACTERS OF THE SUGAR MAPLE (*Acer saccharum*)

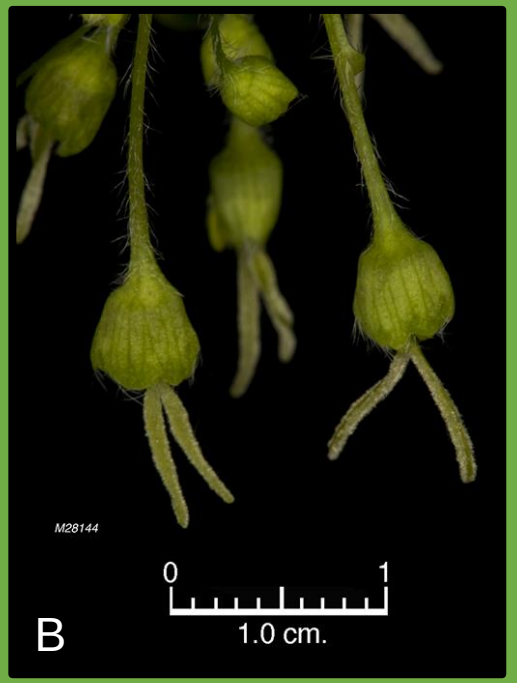
Individuals of this species have bark that peels away from the trunk as they grow older..

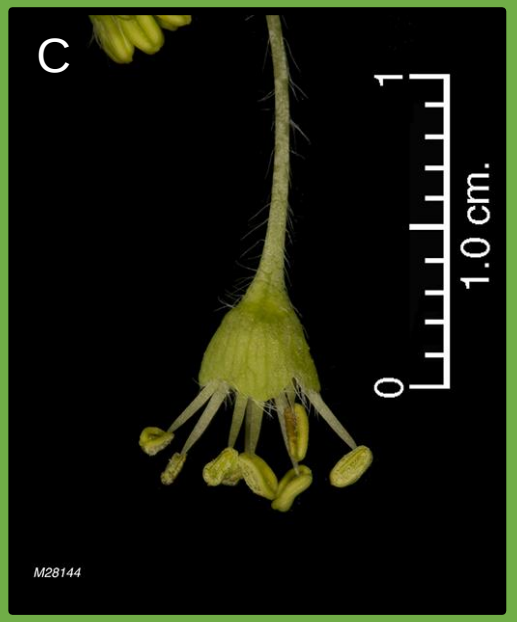


The leaves of *A. saccharum* have five well-defined lobes penetrated by three strong veins and two less developed veins. Note the trichomes in the axils of the veins. They are not glandular as in *A. plantanoides*.



INFLORESCENCE AND FLOWER CHARACTERS OF THE SUGAR MAPLE (*Acer saccharum*)



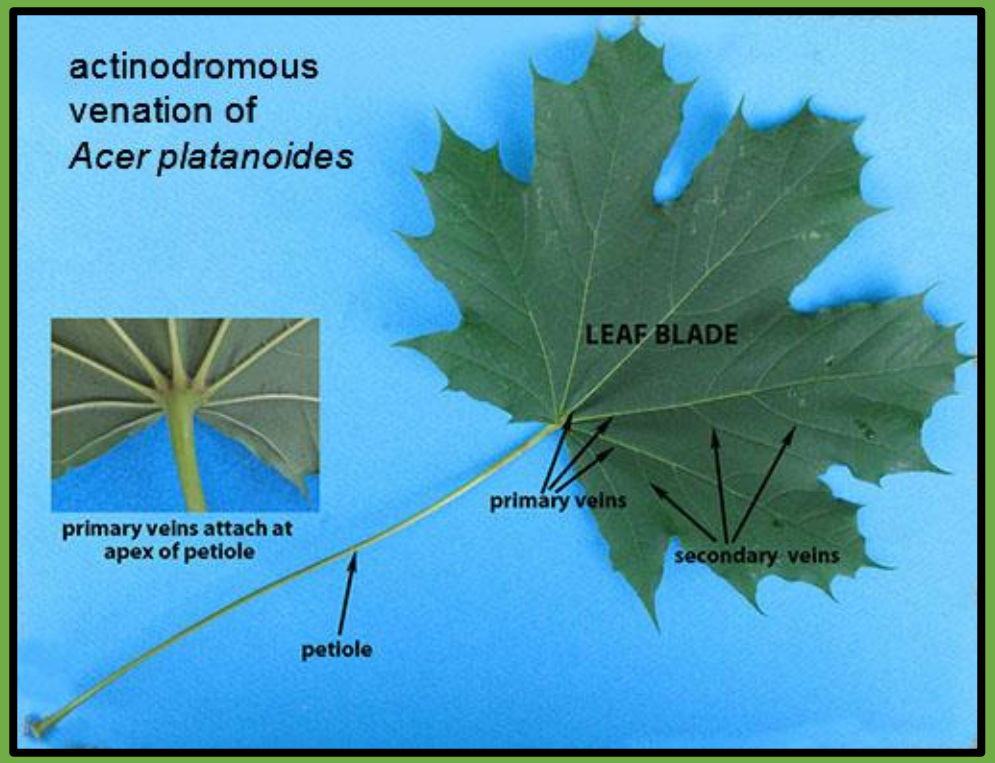


A. Inflorescences yellowish-green. The flowers are at the apices of very long pedicels.
B. Female flowers with stigmas protruding from the perianth.
C. Male flower with stamens exerted protruding from the perianth. In both B and C it is clear that the perianths are cup-like.

FRUIT CHARACTERS OF THE SUGAR MAPLE (*Acer saccharum*)

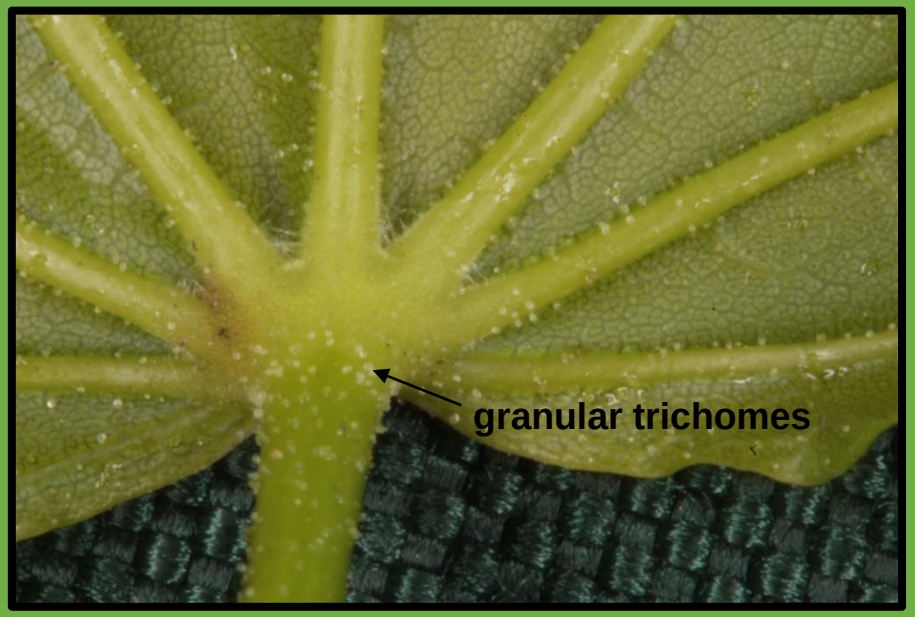
The fruits of this species, as well as those of *A. rubrum*, have their mericarps parallel to one another. In contrast, the mericarps of *A. platanoides* are widely divergent from on another.

BARK AND LEAF CHARACTERS OF THE NORWAY MAPLE (*Acer platanoides*)



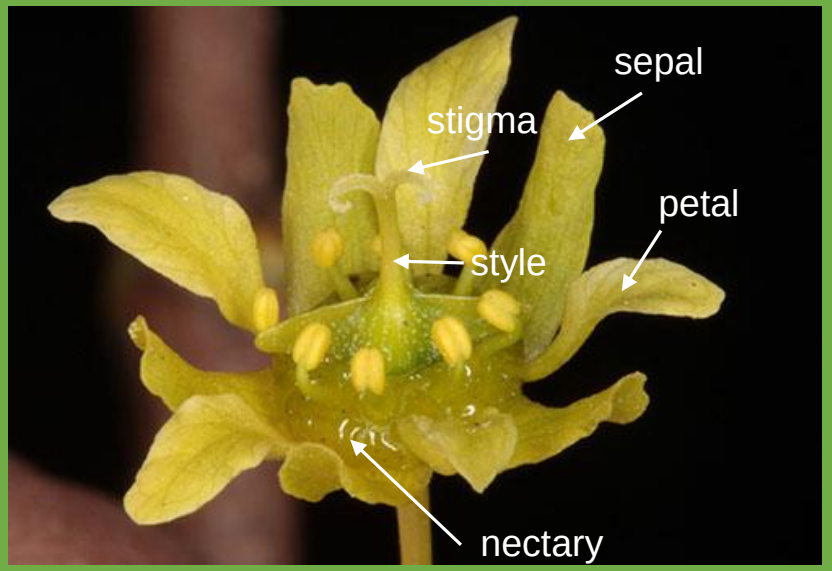
The Norway maple has smooth bark when young. At maturity it develops a well-defined reticulate network of fissures but its bark does not become as shaggy as that of the red and sugar maples. This invasive species from Europe tends to have more leaf blade lobes and a greater number of primary veins than the other two species of maple found in the Preserve.

LEAF CHARACTERS OF THE NORWAY MAPLE (*Acer platanoides*)



The Norway maple tends to have petioles longer than the leaf blade. The margins of the lobes are free of teeth as they are in the sugar maple. The primary veins are usually seven instead of three or five and the granular-like, short trichomes are not found in the other species occuring the Preserve. The Norway maple also has simple, sparse, white trichomes associated with the veins.

FLOWER CHARACTERS OF THE NORWAY MAPLE (*Acer platanoides*)



This species has large, greenish-yellow flowers; a differentiated style and stigma; a biseriate perianth; an extrastaminal nectary; and widely spreading samaras.

BARK AND LEAVES OF THE FLOWERING DOGWOOD (*Cornus florida*)

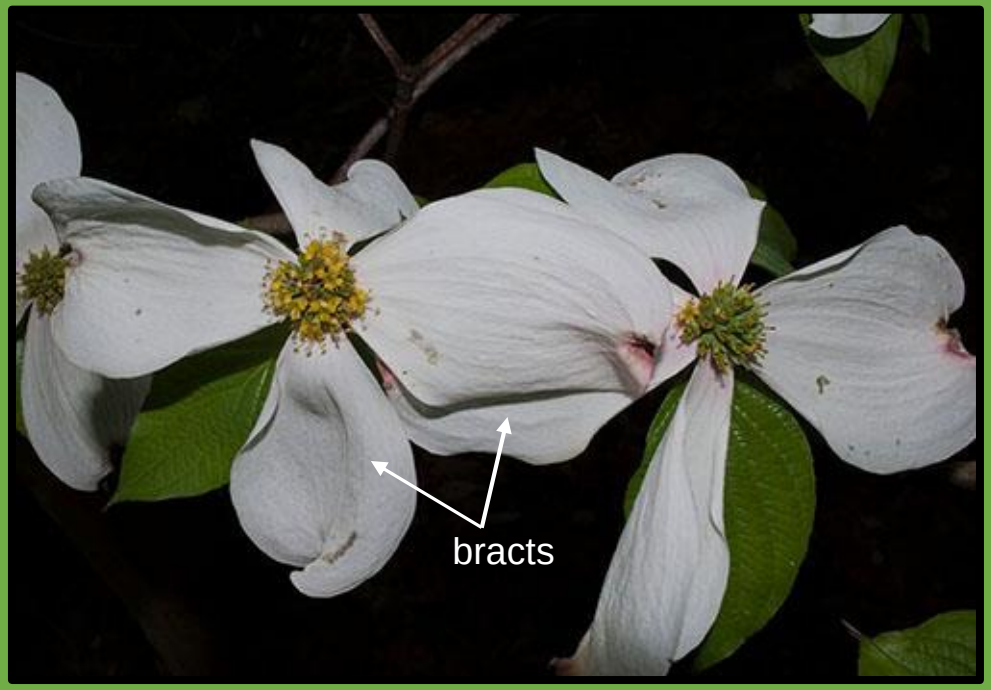
A. Bark with small, irregular, puzzle-like pieces makes it easy to identify this species.

B. The leaves are simple and opposite with entire margins. The upper surface is green and the lower surface is white. This herbarium sheet shows the sympodial growth of the genus. In this type of growth a terminal bud aborts and two lateral buds flush and form shoots that arch upwards.

According to Nelson et al. (2004) there are about 55 species worldwide and 16 native species of *Cornus* in North America. Most of the species are found in temperate regions.

INFLORESCENCES AND FLOWERS OF THE FLOWERING DOGWOOD

What appears to be several flowers are really a head of ca. 20 yellow flowers subtended by very large bracts. The flowers have green calyx-tubes, 4 yellow petals, and 4 stamens with whitish anthers.



MATURE FRUITS AND AUTUMN RED FOLIAGE OF THE FLOWERING DOGWOOD

The fruits are drupes derived from an inferior ovary.

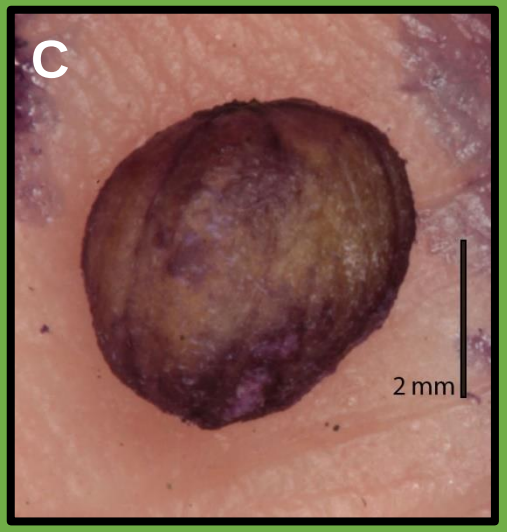
BARK OF THE ALTERNATELEAF DOGWOOD (*Cornus alternifolia*)

Compare the mottled bark of this species with the puzzle-like pattern found in the flowering dogwood.

STEM AND LEAVES OF THE ALTERNATE-LEAVED DOGWOOD

The leaves of most species of dogwood are clearly opposite to one another (see previous image of *Cornus florida*). The leaves of *C. alternifolia* are clustered together so it is difficult to determine if they are alternate or opposite. The stems of both species are sympodial. In this type of growth, a terminal bud aborts and two twigs grow from two other buds. The twigs generally arch upward. Note how robust the twigs of this species are in comparison with those of *C. florida*. The petioles of the alternate-leaved vary in size and the longest are much longer than those of the flowering dogwood.

MATURE FRUITS OF ALTERNATE-LEAVED DOG WOOD (*Cornus alternifolia*)



A. Infructescence showing globose, mature fruits. The inflorescences of this species do not have the large white bracts subtending the flowers as does *C. florida*. B. Single-seeded fruit surrounded by purple pulp. C. Cleaned seed.