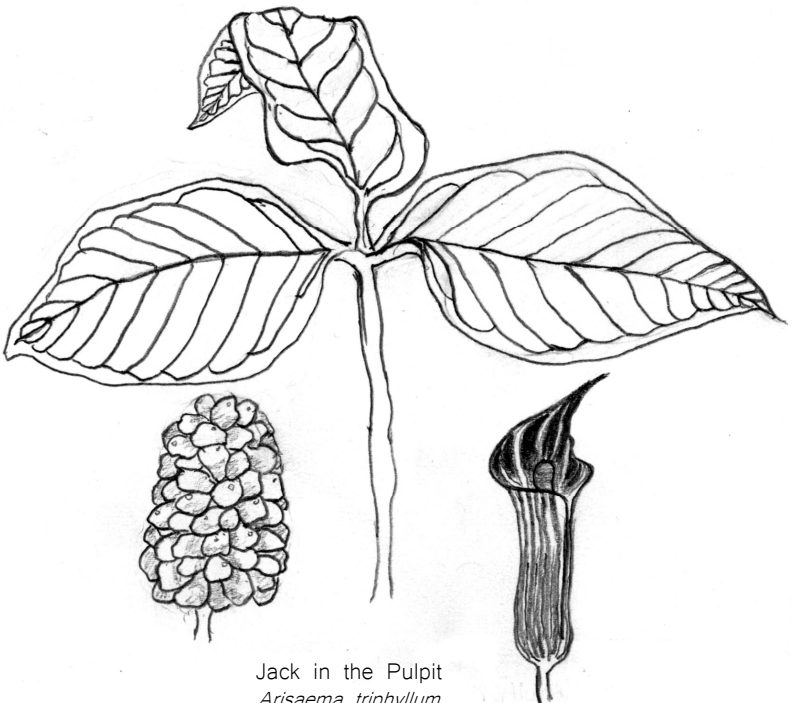# The Florence and Robert
Zuck Arboretum Nature Trail
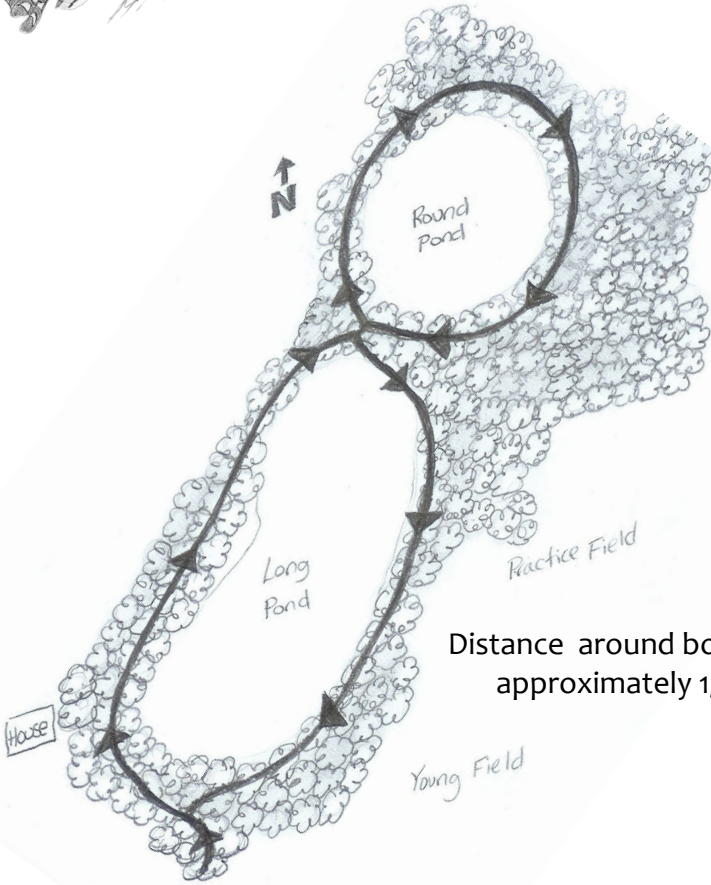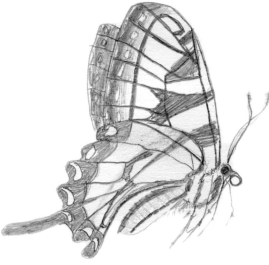
Drew University
Forest Preserve
Madison, New Jersey

Jack in the Pulpit
Arisaema triphyllum
Fruit (left), foliage (center), and flower (right)
Art by Rema Hazuri

Welcome to the Drew University Forest Preserve!

Round Pond

N

Long Pond

Practice Field

House

Distance around both ponds:
approximately 1/2 mile

Young Field

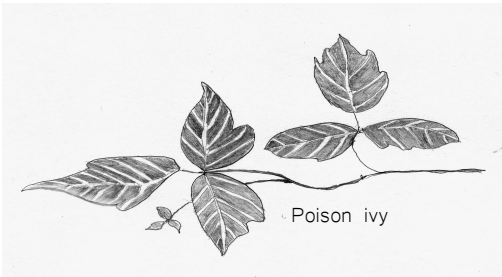Entrance

0   80   160 Feet

This self-guiding nature trail winds through the Zuck Arboretum, a section of the Drew University Forest Preserve that was dedicated to Professors Florence and Robert Zuck for their service to botanical education and environmental protection. You will find a second woodland trail to explore across from the entrance, in the Hepburn Woods Ecosystem Restoration Area, named in honor of environmentalist Chris Hepburn whose generosity made it possible to restore biodiversity throughout the Drew forest.

We are working to restore this natural forest ecosystem, by pulling up invasive species, planting native vegetation, and protecting vegetation by fencing out overabundant deer. This restoration project, a partnership with the U.S. Fish and Wildlife Service and New Jersey Audubon, was awarded the 2012 New Jersey Governor's Environmental Excellence Award for Healthy Ecosystems. By choosing native plants for your yard and garden, you too can enrich the food web and support wildlife.
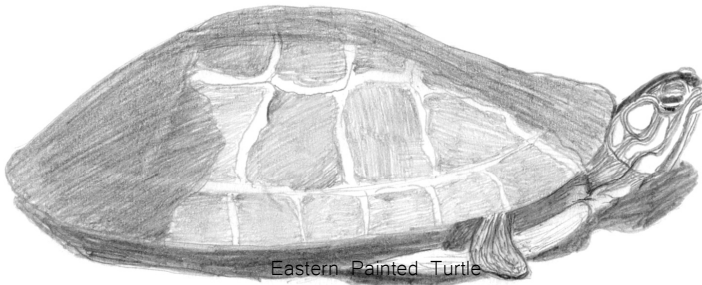~~~~~~

To protect plantings and bird life, please stay on the trail and watch for baby trees we have planted, many marked with plastic field flags. Keep dogs close on the leash and prevent them from digging and trampling vegetation.

Avoid touching poison ivy (Toxicodendron radicans), which is present not only on the ground but also as a tree-climbing vine with fuzzy brown aerial roots which also contain the skin irritant urishol. To avoid an itchy rash, consider the old rhymes: "leaves of three, let it be," and "only dopes climb hairy ropes."

Poison ivy

STOP #1. You call this an arboretum? The messy natural landscape here differs from ornamental garden arboreta. When trees blow down, we leave them to decompose naturally and recycle nutrients in the soil. Dead wood and fallen branches are important enough to have their own scientific acronym: "CWD" (coarse woody debris). Old logs serve as habitat for insects, small mammals, and some birds, while also providing a nutrient-rich substrate on which plants and fungi, whose diversity is declining, can grow. Tidying up by removing dead wood impoverishes the forest.

STOP #2. Enjoy the serene beauty of Long Pond, one of two ponds in the Arboretum. These natural depressions, locally called punchbowls or dells, formed 12,000 years ago where melting glaciers left behind large ice blocks. Today, our ponds hold water only because they were lined with clay many decades ago when they were part of the private Dodge Estate. Yet these waters teem with wildlife: microscopic plankton, frogs, painted turtles, catfish, carp, dragonfly larvae, and tiny invertebrates. This gloriously intricate food web draws predatory birds including great blue herons, green herons, and belted kingfishers. This ecosystem is a natural laboratory for scientific research by Drew students.

Eastern Painted Turtle
Chrysemys picta picta

~ Turn left and walk around the pond ~

STOP #3. This ancient tree is a native white oak, one of our region's dominant trees. Look for holes where birds can hide their nests. Woodpeckers, wood ducks, and other cavity-nesting birds depend on old hollow trees like this one. Notice this oak's large, spreading branches, which provide a clue to the past. Trees that grow up in a closed forest have a different, narrower shape with branches only near the top. From this tree's wide "open growth" shape we know this area was an open, sunny field over a century ago when this oak got its start.

Great Blue Heron
Ardea herodias

STOP #4. Baby trees! Look here for small sassafras trees, distinct for their odd mixture of oval leaves and mitten-shaped leaves. Crush a bit of a leaf or scrape a leaf stem with your fingernail and sniff for a delightful spicy aroma. No trees were reproducing in the Drew Forest until deer were fenced out in 2011. Within two years, baby sassafras and sour gum trees appeared everywhere, promising another generation of forest for the future.

STOP #5. Huge trees fell into Long Pond during Hurricanes Irene (2011) and Sandy (2012). In lakes and streams as on land, dead logs and branches are valuable. They create structural complexity that enriches the diversity of life. Underwater, the dead tree's skeleton provides places for hiding and for attachment. Above the water, turtles bask while birds perch and forage. This particular tree is a favorite of the green heron.

STOP #6. The Zuck Arboretum was dedicated to honor the eminent retired botany professors, Florence and Robert Zuck, who helped to build a renowned college program in botany that trained many scientists. Florence was active in the conservation community through, for example, the definitive study of plants of the Great Swamp National Wildlife Refuge.

STOP #7. Here an experimental deer exclosure was built in 1999. Inside young trees flourished, but elsewhere the deer herd devoured native wildflowers, shrubs, and trees down to the ground. The future of the forest was clearly in jeopardy. This research led to the decision to protect 18-acres of the Drew Forest with deer fencing.   The deer population is high for two reasons: abundant nutritious food we provide by growing delicious lawns and gardens , and absence of natural predators.   This old exclosure is no longer maintained because the entire arboretum was fenced in 2011.

~ Walk quietly now to the next stop ~
~ Watch and listen for wildlife ~

STOP #8. Welcome to Round Pond. If you hear a peep and a splash, you might be hearing startled frogs as they jumped from the pond's edge to deeper water. Some visitors here include painted turtles basking on logs and a large great blue heron that poses like a statue in order to catch a fish by surprise (picture at left) .

Have a seat and take a quiet breath. Listen to the sounds of the Arboretum: calls of birds and rustling of squirrels mixed with the sounds of civilization. It is always true: if you pause quietly for a while you're more likely to see wildlife.
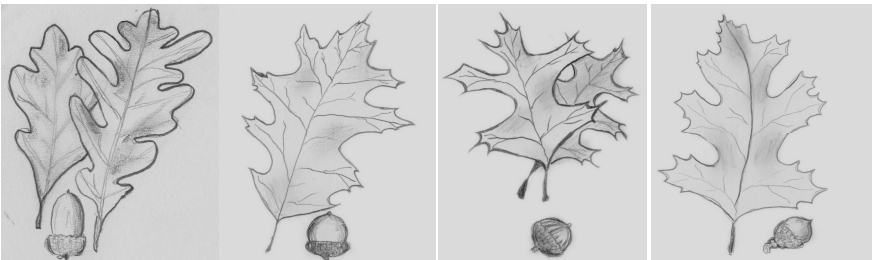
STOP #9. When a tree like this blows down, its roots plow the soil to create a hill called a tip-up mound. The exposed bare soil is a perfect seed bed for birch trees and wildflowers whose tiny seeds can't sprout through the carpet of decomposing leaves everywhere else on the forest floor. Here we also see a second "microsite" on the landscape: a deep pit from which the roots were torn. A windthrow pit makes a cozy place to burrow or hibernate. Where the water table is close to the surface, a pit may become a little wetland where frogs can thrive. Tip-up mounds and pits may persist for centuries, giving the land a naturally bumpy surface.

STOP #10. When lakes and rivers are not blue but green, red, or brown, the cause is an abundance of algae, the microscopic, plant-like photosynthesizers of aquatic ecosystems. Such algal "blooms" occur naturally but are stimulated by fertilizers running off from farms and fertilized lawns. As a result coastal areas from Barnegat Bay to the Gulf of Mexico experience extreme algal blooms that deplete oxygen and thus kill fish and other marine animals.

STOP 11. Two trees in this cluster, including the biggest one, are Norway maples, native of Eurasia and highly invasive in forests across North America. Research here at Drew University showed that Norway maple trees suppress the diversity of native shrubs and wildflowers. It spreads to forma monoculture—a single-species forest. Thus Norway maple is being removed at great expense from nature preserves and parks nationwide in order to restore biodiversity. It is surprising that Norway maple is still a top-selling shade tree.

STOP 12. The tall tree by this sign is a native pin oak, which thrives in swamps but also grows well on dry sites. Look for oak leaves on the ground to compare with the sketches below of four native oaks found here. Pin oak leaves have sharp, pointed lobes (tips) while white oak (seen at stop #2) lobes are rounded. Black and red oak leaves are nearly identical, but their acorns are more distinctive, with a shallow flat cup for red oak acorns. New Jersey has a dozen different species of native oaks!

White oak
oak (Quercus alba)   Red oak   Pin oak   Black
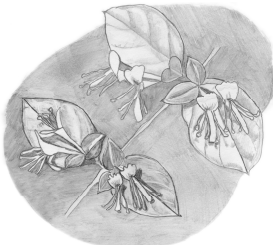   (Quercus rubra)   (Quercus palus-
tris)   (Quercus velutina)

STOP 13. This large tree is a sugar maple, one of our native maples whose sweet sap is boiled down to produce maple syrup. Sugar maple and its non-native, problematic cousin the Norway maple (see stop #11) have very similar leaves. To tell the difference, pluck a maple leaf from across the path or to your left, and tear across the leaf stalk.   If a white drop of milky sap appears, you have an invasive Norway maple; sugar maple sap is clear.

STOP #14. Who lives under this tree? When roots were loosened by the wind many years ago, wildlife habitat was created. Underneath can be found a fox den. Look carefully to your left for the entrance hole. The red fox is most active at night, and it is a rare treat to spot one. An omnivore like us, the fox eats berries and grasses as well as animals, especially mice and insects.

STOP #15. This section of the Arboretum was a solid thicket of problematic invasive plants until recently. Garlic mustard, with wrinkled heart-shaped leaves and tiny white flowers in early spring, kills beneficial soil fungi on which many tree seedlings rely. Japanese honeysuckle is an aggressive vine that escaped from gardens to choke out young trees. Japanese barberry shrubs, prickly with hard red berries, change the form of nitrogen in the soil to the detriment of wildflowers. Thanks to painstaking hand-pulling by dedicated students, native plants are coming back. Do you recognize baby sassafras trees? (see #4).

Japanese honeysuckle
Lonicera japonica

Garlic Mustard
Alliaria petiolata

~At the bench, turn left to head back to Long Pond ~

STOP #16. Check out this enormous fallen tree with its dramatic tip-up mound and pit. Forests will recover from hurricane damage as new trees replace the old, but only if conditions permit. In our area, new openings in the woods will not be filled by a new generation of native trees when surrounded by invasive plants and beleaguered by too many hungry deer The popular practice of thinning out forests is not beneficial to the forests of eastern North America.

STOP #17. This tree with smooth grey bark is the American beech, a native tree abundant in undisturbed forests where it can grow up in the deep shade under other trees. Beech trees reproduce in two ways: by small nuts in a prickly husk and by sprouts from the roots. Can you find small beech sprouts near the tree trunk? In the Drew Forest, neither sprouts nor beech seedlings survived until protective deer fence was built. Note: Graffiti can kill trees because it injures the precious veins just under the bark.

STOP #18. Notice the bark on the trees around you. On your right is a black birch, whose grey bark is marked with horizontal lines that resemble the striking black lines on white of the better-known paper birch. Now compare with the bark of the tulip tree to your left. Can you find a beech tree nearby? Beeches have smooth grey bark, without the horizontal lines of the black birch but with very similar oval leaves. It's useful to identify trees by their bark in the winter and when leaves are out of reach. Close your eyes and notice the differences in texture.
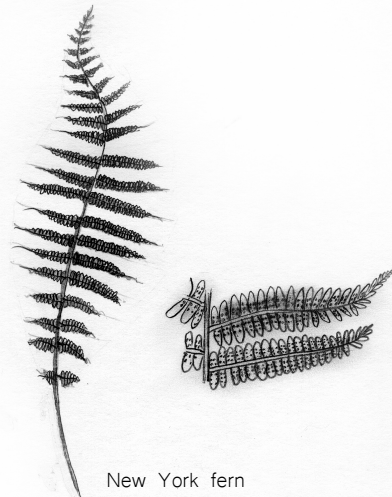
STOP #19. At your feet are bright green New York ferns. Like other ferns, these natives spreads with underground stems to form interconnected colonies, called clones because they are genetically uniform. Ferns also reproduce with tiny spores dispersed by the wind but do not produce seeds. Ferns dominated Planet Earth long before seeds and flowers evolved. Today ferns are still abundant and diverse, from these low fronds to smaller floating ferns to large tropical tree ferns.

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Thank you for visiting the Drew Forest Preserve!! Feel free to keep this brochure, or return it to the box for reuse.

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This updated (2013) brochure builds on the work of former Drew students Natasha Davis and Rema Hazuri. Artwork is by Rema Hazuri.

Questions or comments are welcome!. Contact Professor Sara Webb, Drew Forest Preserve Director, at swebb@drew.edu .

New York fern
Thelypteris noveboracensis
Frond（left）and close-up of leaflets showing position of sori（right）