Harvard Forest Schoolyard Ecology Appendix to "Our Changing Forests" Field Site Description: A Visual Guide to Forest Pests and Pathogens

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- **Hemlock Woolly Adelgid**

"The Hemlock Woolly Adelgid (HWA) is an invasive, aphid-like insect. It was first reported in the U.S. in Virginia in 1951. In New England, the insect attacks and--over a period of years--kills eastern hemlock trees. Millions of trees have been infested or killed from Georgia to southeastern Maine." Harvard Forest website: http://harvardforest.fas.harvard.edu/other-tags/hemlock-woolly-adelgid-hwa

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Woolly Adelgid Egg Sacs found on underside of needles

Photo by U.S. Forest Service

Adult Adelgid with eggs. This insect is the size of a period on this paper. Hand lens needed for identification.

- **Asian Long-Horned Beetle**

"The Asian long horned beetle (ALB, *Anoplophora glabripennis*) is a destructive wood-boring pest of maple and other hardwoods. ALB was first discovered on several hardwood trees in the United States in Brooklyn, New York, in August 1996. ALB is believed to have been introduced into the United States from wood pallets and other wood packing material accompanying cargo shipments from Asia. ALB was later detected in Chicago, Illinois, in July 1998. The Secretary of Agriculture declared an emergency in order to combat the infestation with regulatory and control actions. In October 2002, the beetle was found in Hudson County, New Jersey, and then in Middlesex and Union Counties, New Jersey, in August 2004. In August 2008, ALB was discovered in Worcester County, Massachusetts, and in July 2010, ALB was found in Suffolk County, Massachusetts." USDA website: http://www.aphis.usda.gov/wps/portal/aphis/ourfocus/importexport?1dmy&urile=wcm%3apath%3a%2Faphis_content_library%2Fsa_our_focus%2Fsa_plant_health%2Fsa_domestic_pests_and_diseases%2Fsa_pests_and_diseases%2Fsa_insects%2Fsa_alb%2Fct_asian_longhorned_beetle

Adult Male A.L.B., 1 inch to 1.5 inches in length with six legs and a shiny black body with random white spots

A.L.B. Exit holes on trunk

- **Hemlock Borer**

"The hemlock borer, *Melanophila fulvoguttata* (Harris), is a pest of eastern hemlock, *Tsuga Canadensis*, throughout its natural range. Although normally considered a secondary pest and seldom abundant, the borer can develop to outbreak conditions following wind-throw, drought, excessive stand openings, or attacks by other primary pests such as the hemlock woolly adelgid *(Adelges tsugae)* or hemlock loopers *(Lambdina* spp.)." USDA: http://www.nrs.fs.fed.us/pubs/1041

Adult Hemlock Borer, 10 mm long; width at the base of the wing cover is 3 mm

Mature H.B. Larva is translucent white, 2.5 cm long

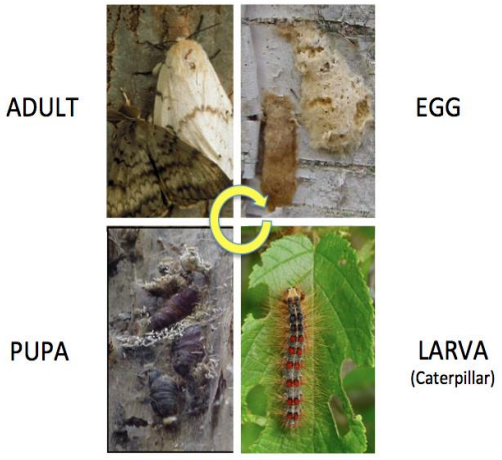


Photos from USDA

Galleries created by H.B. Larvae | Initial holes by Woodpeckers Searching for H.B. Larvae | Resulting inner reddish bark

- **Gypsy Moth**

"The gypsy moth, *Lymantria dispar*, is one of North America's most devastating forest pests. The species originally evolved in Europe and Asia and has existed there for thousands of years. In either 1868 or 1869, the gypsy moth was accidentally introduced near Boston, MA. Every year, isolated populations are discovered beyond the contiguous range of the gypsy moth but these populations are eradicated or they disappear without intervention. It is inevitable that gypsy moth will continue to expand its range in the future. The gypsy moth is known to feed on the foliage of hundreds of species of plants in North America but its most common hosts are oaks and aspen. Gypsy moth populations are typically eruptive in North America; When densities reach very high levels, trees may become completely defoliated. Several successive years of defoliation , along with contributions by other biotic and abiotic stress factors, may ultimately result in tree mortality. In most northeastern forests, less than 20% of the trees in a forest will die but occasionally tree mortality may be very heavy." USDA: http://www.fs.fed.us/ne/morgantown/4557/gmoth/



Photos by Univ. of Wisconsin Cooperative Extension

- **Beech Bark Disease**

Beech bark disease (BBD) has been deforming and killing American beech (*Fagus grandifolia*) trees in the Eastern United States since the 1930s. A beech scale insect (*Cryptococcus fagisuga*) first attacks tree bark, creating a wound that provides an entryway for two different fungi (*Neonectria coccinea* var. faginata and Neonectria galligena) to invade the tree. The fungus grows and kills the living tissue under the outer bark, resulting in cankers that can eventually girdle and kill a tree. Trees that survive may become disfigured." USDA: http://na.fs.fed.us/fhp/bbd/beech-bark-disease-pest-alert_120329.pdf

Figure 1. *Cankers caused by* Neonectria faginata *on the stem of a beech tree.*

Beech Scale is a microscopic sized insect so one would look for the cankers on the bark to identify this disease.

- **Ash Yellows**

Ash yellows is a recently discovered disease that causes slow growth and decline of ash (Fraxinus) species. Ash yellows went undetected until the 1980s because its symptoms were not differentiated from those of decline caused by adverse environmental factors such as drought, shallow soils, flooding, or parasitism by opportunistic fungi. Current knowledge supports the theory that ash decline can result from various causes, and ash yellows can be, but is not always, a causal factor. USDA: http://www.ncrs.fs.fed.us/pubs/viewpub.asp?key=916

Photos by USDA

Die back and "witches brooms" characteristic of Ash Yellows disease

- **Emerald Ash Borer**

A beetle from Asia, *Agrilus planipennis Fairmaire* (Coleoptera: Buprestidae), was identified in July 2002 as the cause of widespread ash (Fraxinus spp.) tree decline and mortality in southeastern Michigan and Windsor, Ontario, Canada. Detected in recent years in New England. Larval feeding in the tissue between the bark and sapwood disrupts transport of nutrients and water in a tree, eventually causing branches and the entire tree to die. Tens of millions of ash trees in forest, rural, and urban areas have already been killed or are heavily infested by this pest. USDA: http://www.emeraldashborer.info/files/eab.pdf

Adult E.A.B. are slender, elongate, and 7.5 to 13.5 mm long, bronze, golden, or reddish green overall, with metallic emerald green wing covers"