PLANT HEROES

Help the Plant Heroes protect our forests by slowing the spread of pests and diseases!

INSECT EMERALD ASH BORER BEGINNER ACTIVITY BOOK

PLANTHEROES.ORG

Aponi Star

BE A PLANT HERO!

Help Aponi slow the spread of the emerald ash borer!

Plant Protection Program

AMERICAN PUBLIC GARDENS ASSOCIATION

Meet the PLANT HEROES!

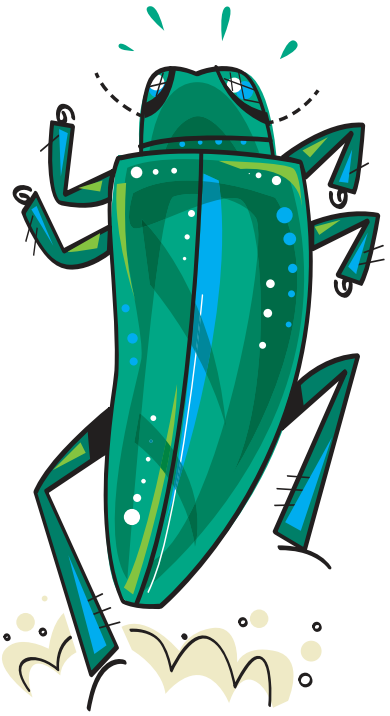
LAURA WILKINS
From: Athens, Georgia
Hobbies: playing the trumpet, gardening, studying ecology

FRANKIE BARKER
From: Shrewsbury, Massachusetts
Hobbies: climbing trees, camping

NATE GREEN
From: Tacoma, Washington
Hobbies: going on adventures, learning about fungi

APONI STAR
From: Southeast Illinois
Hobbies: learning more about entomology (the study of insects)

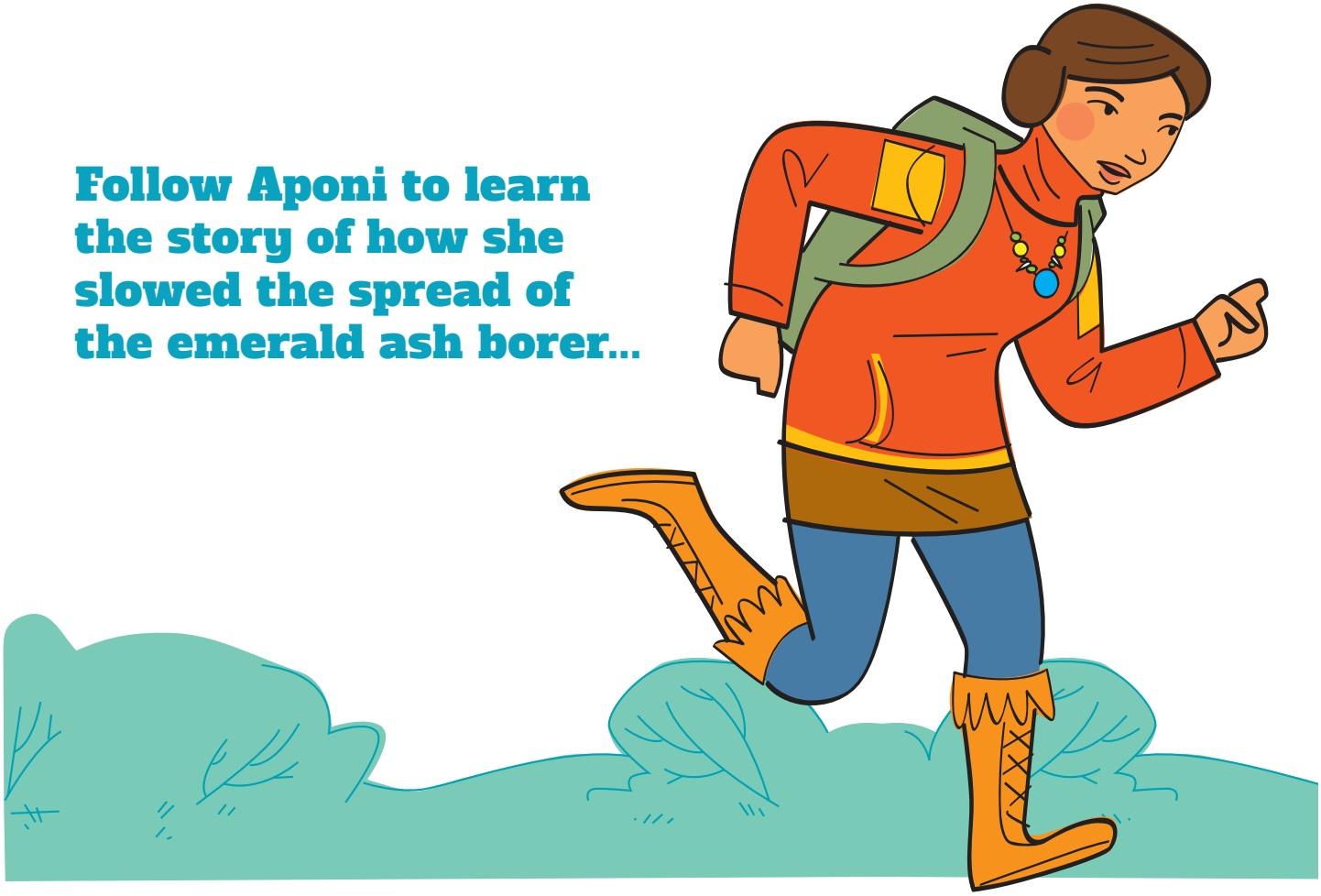
plantheroes.org



The Plant Heroes are four friends who love spending time in nature more than anything else! They enjoy climbing trees, walking trails, and camping.

The heroes are learning about why our forests are in danger. There are insects and fungi that can impact trees, sometimes affecting the health of whole forests. Trees may become sick or die when they are weakened by an invasive species, a living thing that is introduced to a new environment where it can cause damage to existing organisms.

Follow Aponi to learn the story of how she slowed the spread of the emerald ash borer...



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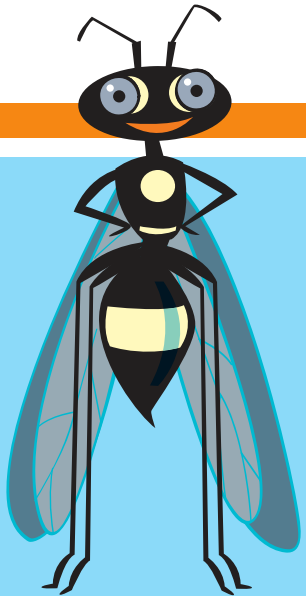
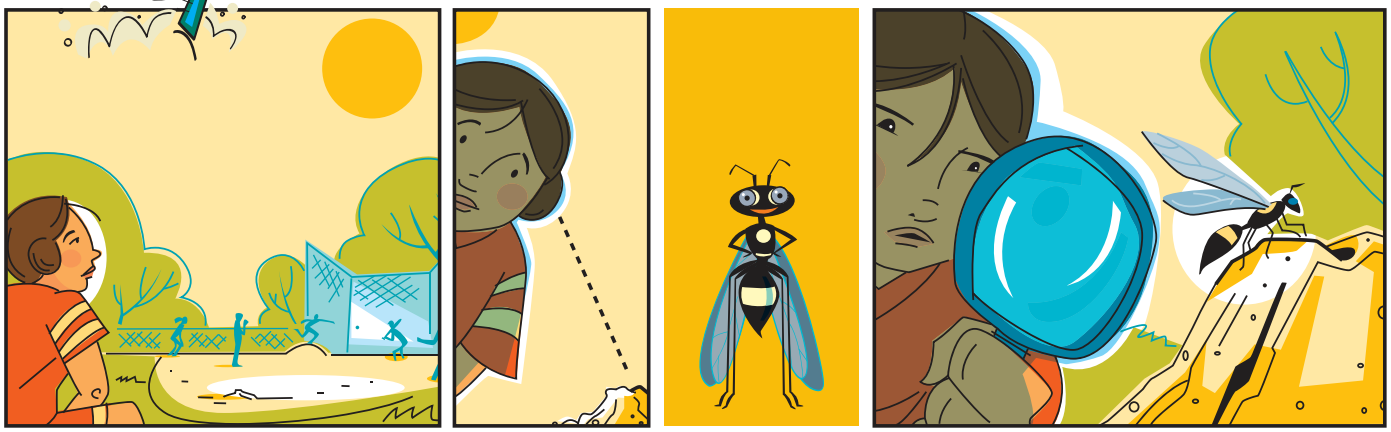
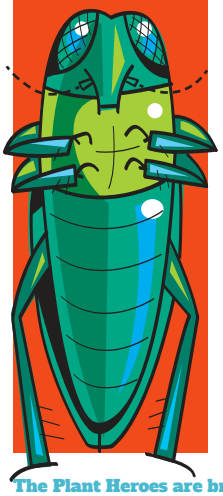
WASP WATCH

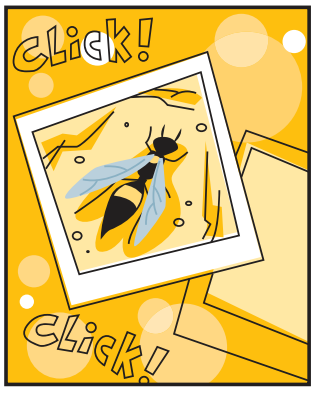


Aponi and her cousins were playing softball during a summertime family reunion picnic at a neighborhood park in Harrisburg, Illinois. While bored to death (nobody was hitting well that day!) she noticed a patch of small dirt mounds in center field.



After the game, she went back to inspect more closely, and realized that these were ground nests and eventually saw a small wasp entering the burrow. She took a picture of the bug and looked it up in her *Field Guide to Flying Insects of the Midwest* when she got home and learned that this was the famed species of wasp, *Cerceris fumipennis*, known for hunting emerald ash borer.





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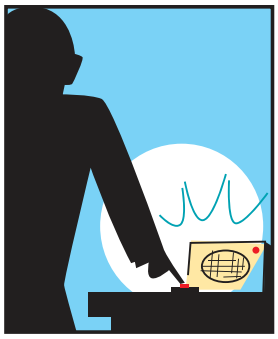
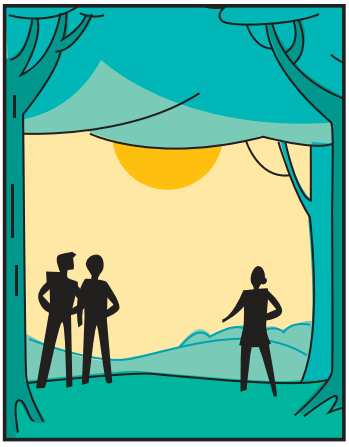
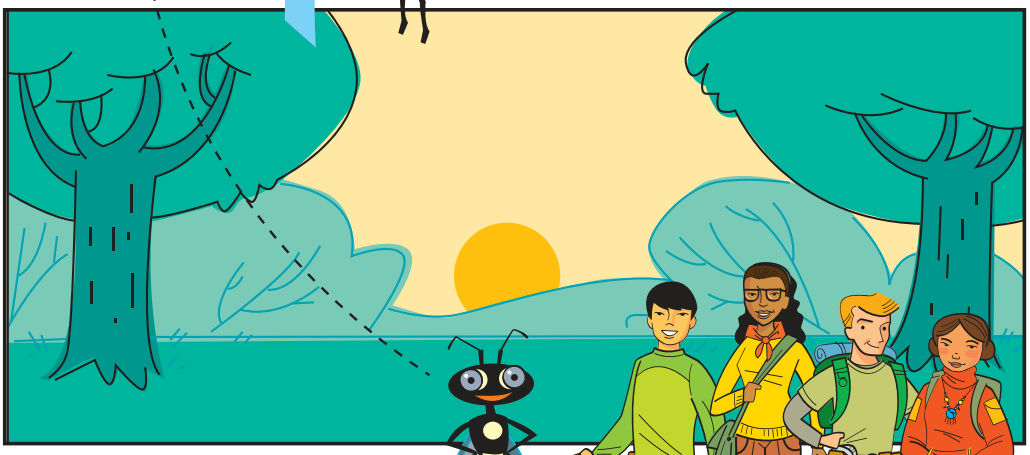
Aponi shared this finding with her county extension agent, who explained that using the wasp to track the location of emerald ash borer was called "biosurveillance" and put her in touch with her state's pest survey coordinator.







The presence of the wasp in the area helped local officials find and remove a stand of infested ash trees (the first found in this part of the state) and prevent the borer from spreading into the nearby Shawnee National Forest!

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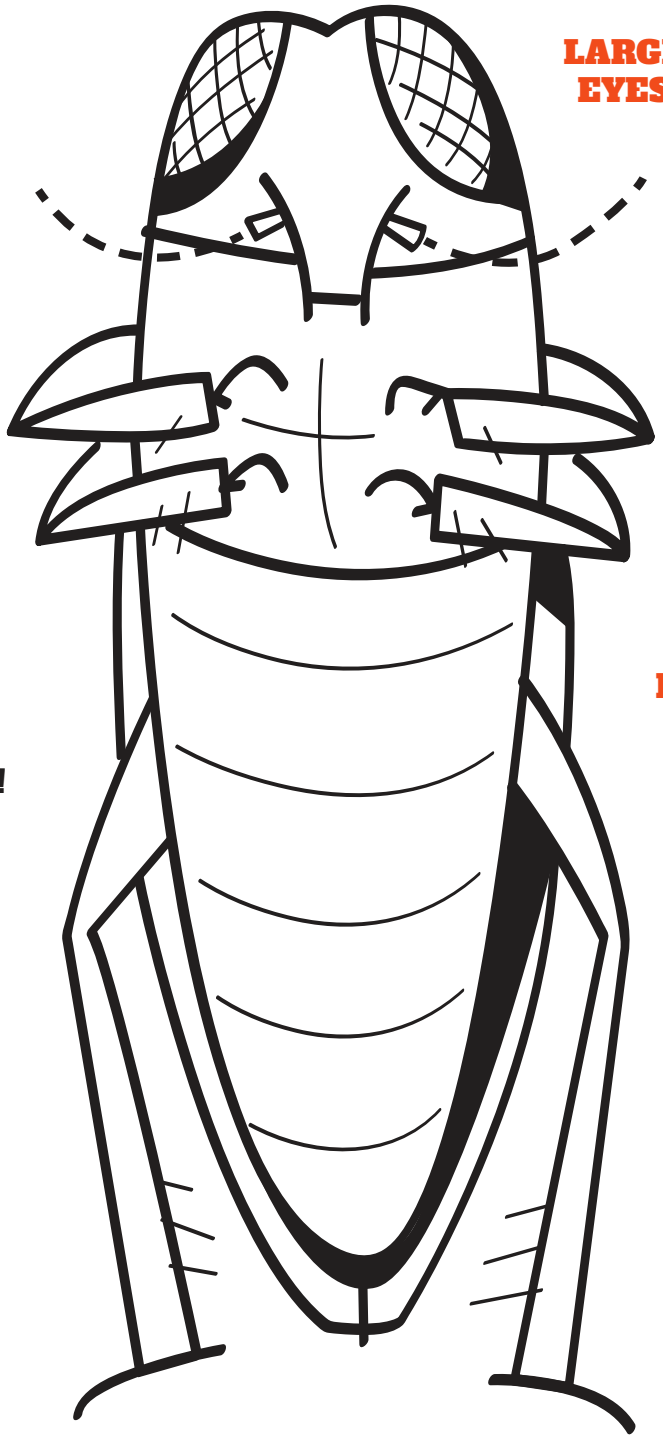
A Bright Beetle

The emerald ash borer, a beetle that normally lives in Asia, ended up in North America. Emerald ash borers can do damage to trees when they do not have natural predators in the ecosystem, which is the case in North America. The emerald ash borer has sparkly green outer wings and a matching head. Color in the emerald ash borer below!

ANTENNAE:
can move like arms and legs; used to sense things like tastes, smells, and sounds

LARGE EYES



BODY AND FOREWINGS:
sparkly green

COLOR THE EMERALD ASH BORER!

Lifecycle Maze

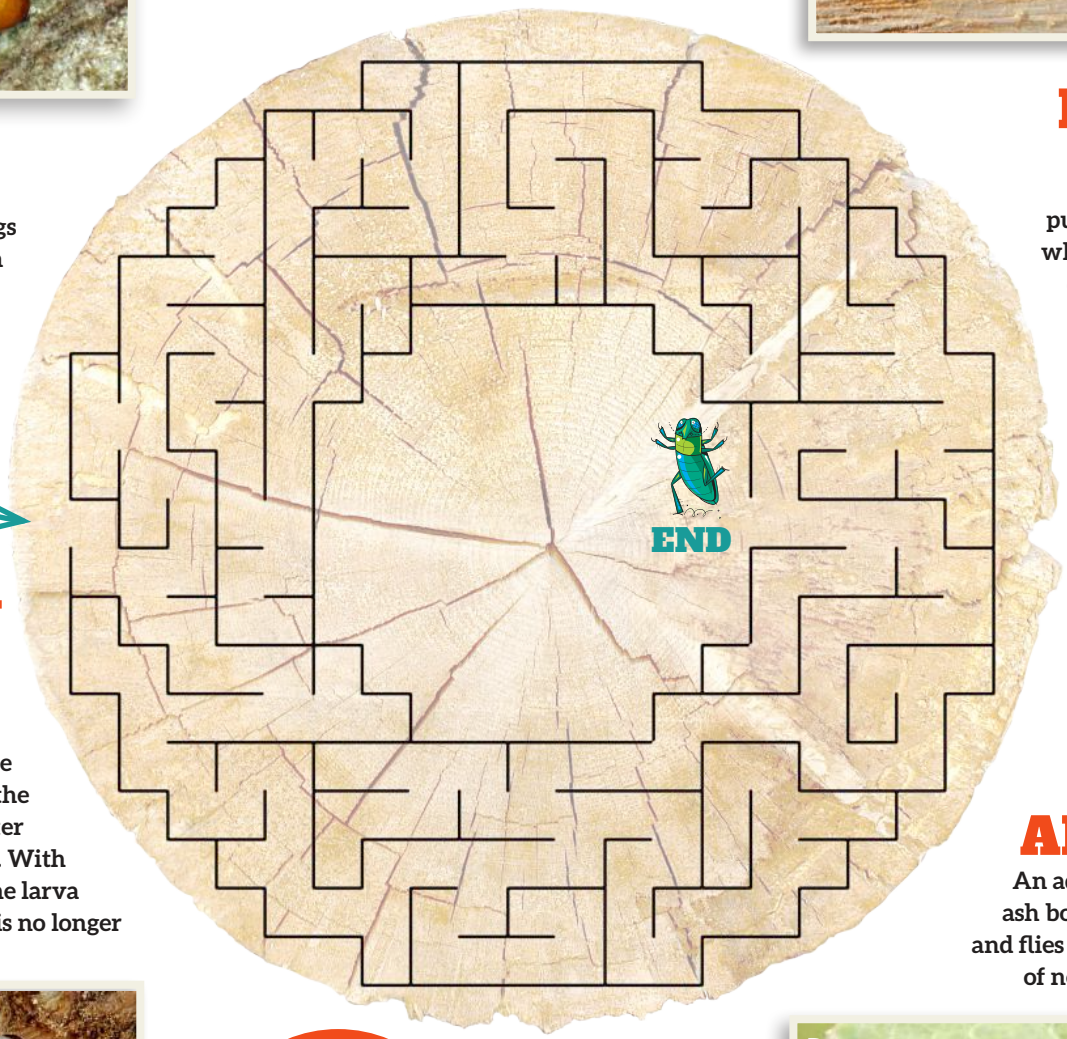
The emerald ash borer goes through several life stages (changes) during its lifetime. Adult beetles lay eggs on ash trees and larvae hatch from those eggs. After eating parts of the ash tree, the larvae change into pupae, and finally into adults. Can you solve the maze below to see the emerald ash borer complete its life cycle?

EGGS

A female adult beetle lays its eggs on the bark of an ash tree.

PUPA

The larva becomes a pupa and rests while it slowly changes into an adult.



LARVA

The egg hatches into a larva. The larva begins to eat the part of the tree that allows the tree to carry water up from its roots. With all the tunnels the larva creates, the tree is no longer able to drink!

ADULT

An adult emerald ash borer emerges, and flies off in search of new ash trees!

HANDY TIP!
Add an "e" at the end of larva or pupa if you are talking about more than one larva or pupa!

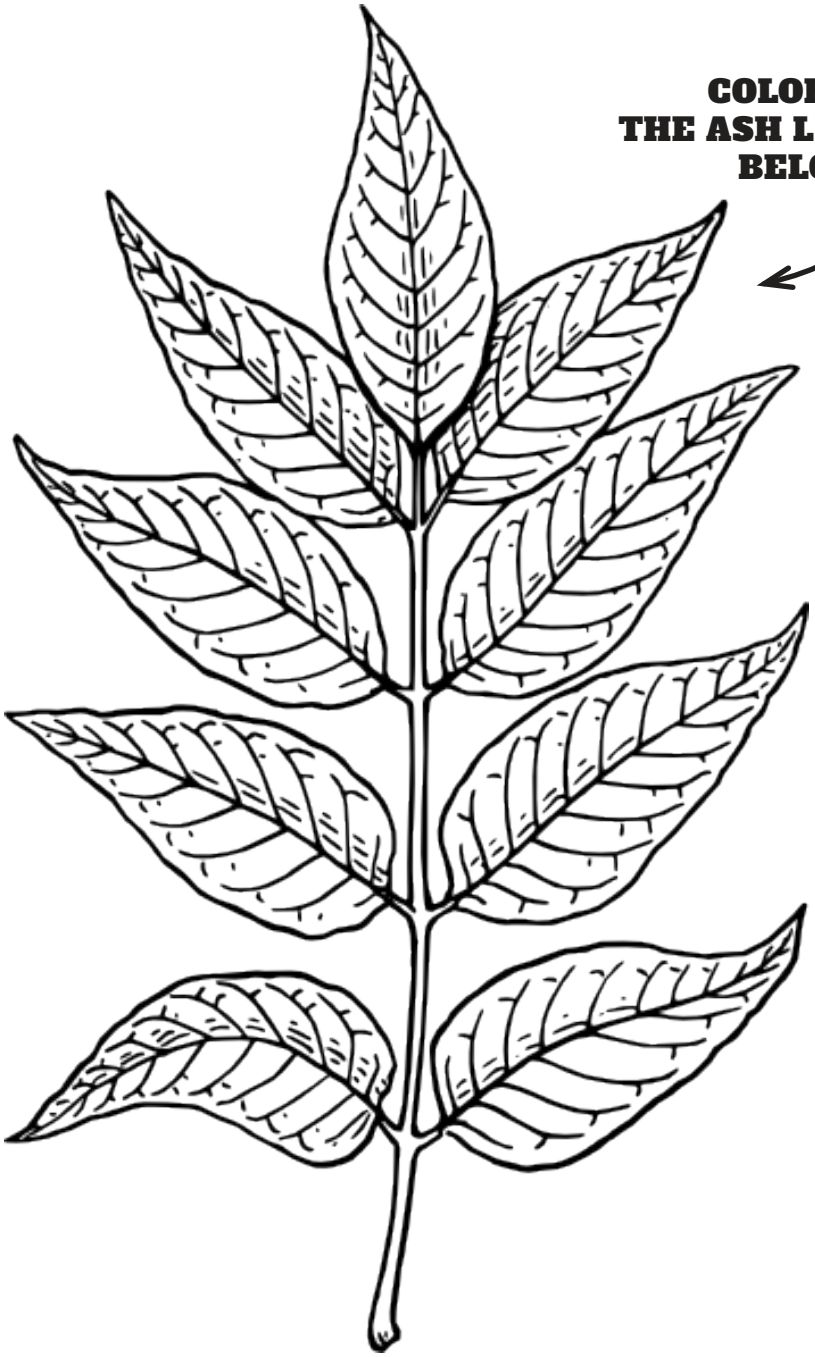
PHOTO CREDITS: A: Houping Liu, Bugwood.org; B: David Cappaert, Bugwood.org; C: David Cappaert, Bugwood.org; D: Leah Bauer, Bugwood.org

The Beetle's Favorite Trees

The emerald ash borer lives in and feeds on ash trees. Look around in the woods, parks, or gardens near you and see if you can find an ash tree. Use the handy checklist below to identify your tree—can you check all the checkboxes? If so, it's probably an ash tree!

- ☐ Look at a leaf on the tree and find where it meets the branch. Ash trees have 5-11 small leaflets that together make up one big leaf!
- ☐ Older trees will have deep ridges in the bark. Look at the ridges; can you see any diamond shapes?
- ☐ The seeds are held in papery long sleeves and are usually hanging in bunches, like bananas do.

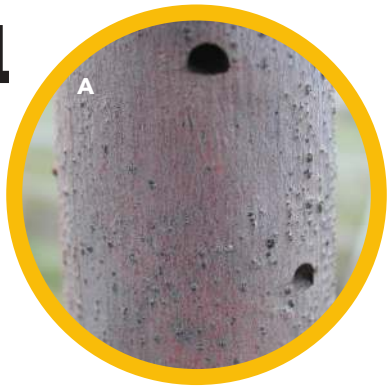
COLOR IN THE ASH LEAF BELOW!



Trees in Trouble

When emerald ash borers eat parts of ash trees, they cause injuries called "symptoms." An ash tree that is in trouble will have symptoms like the ones in the pictures below. Can you match the picture with the description?

1



2

3

A. Trees drop their leaves when they can't get water.

B. These curvy tunnels inside the tree trunk are created by hungry larvae.

C. An adult emerald ash borer makes a sideways D-shaped hole when it exits an ash tree.

HOW DO PLANTS GET WATER?

Check out this video with a cool experiment all about how plants get water!
Scan the QR code with a phone or type in https://bit.ly/howdoplantsdrink

plantheroes.org

PHOTO CREDITS: A: PA DCNR, Bugwood.org; B: Kelly Oten, Bugwood.org; C: Steven Katovich, Bugwood.org

Our Insect Friends

In the comic story, you read about a small wasp that can help us slow the spread of emerald ash borers. This wasp is a helper insect and will not sting humans. Did you know there are wasps that don't sting? All insects in the world around us have a role in nature. Many are very important and beneficial (helpful) to plants. To learn more about helper insects, answer the riddles below!

spider

ladybug

bee

dragonfly

butterfly

1 I am a flying insect with black and yellow stripes. I help to pollinate flowers, and without me there would be no blueberries, apples, peaches, or chocolate! Who am I?

2 I fly from flower to flower with my big colorful wings and use a long straw-like mouth part to drink the sweet nectar from flowers. Who am I?

3 I am a small, round beetle with a red body and black spots. I eat aphids! Who am I?

4 I am not actually an insect and I have eight legs. I trap many insects in my sticky web. Who am I?

5 I have a long, narrow body and thin, see-through wings. Mosquitos are one of my favorite foods! Who am I?

PHOTO CREDITS: A: sama093, Flickr.com; B: Hali Joonas, Flickr.com; C: Renee Grayson, Flickr.com; D: John Bolland, Flickr.com; E: Peter Miller, Flickr.com

Our Insect Friends

Fill in the blanks in the story below!

WORD BANK:

FIREWOOD 

BARK 

TENT 

ASH 

TREE 

ADULT BEETLES 

Aponi and her father are planning for a long camping trip in Ohio. They've gathered the raingear, coolers, _____ , and their hiking boots—now they just need _____ for their firepit! Aponi's father finds some old firewood from a _____ they cut down a few months ago and starts to stack it in the back of the car. Aponi runs after him to gather another load, but stops in her tracks when she notices larvae crawling around in tunnels under the _____. She examines the tree and, just as she feared, it is an _____ tree. This is the tree emerald ash borers likes to eat. She knows if they bring these logs to Ohio they could accidentally move the larvae, which will soon turn into pupae and then _____, and damage more ash trees! Aponi rushes over to show the signs to her father. They decide to call their local insect experts about the larvae and pick up some firewood at the campground instead.

ANSWER KEY

Trees in Trouble: 1. c; 2. b; 3. a

Our Insect Friends: 1. Bee, 2. Butterfly 3. Ladybug 4. Spider 5. Dragonfly

Gone Camping: tent, firewood, tree, bark, ash, adult beetle

PLANT HEROES

Join our team of Plant Heroes and learn about trees, forests, and the natural world around you!

PLANTHEROES.ORG

You can be a Plant Hero!

Are you curious about plants and animals? Do you like asking questions about nature? Do you enjoy being outdoors and having fun, climbing trees, balancing on logs, or finding a new butterfly or beetle? If so, you are already on your way to becoming a Plant Hero! We invite you to join forces with Nate, Laura, Aponi, and Frankie to protect the plants and ecosystems we all love.

How can you become a Plant Hero?

Join our team and go on a journey with Nate, Aponi, Laura, and Frankie. As a Plant Hero, you will learn to notice when plants are in trouble. You will also find out ways you can act quickly to help find solutions in your own neighborhood. Follow their adventures and learn how they help plants and ecosystems stay healthy.

On the Plant Heroes website, you will find materials to help you learn about plants, forest health, and ecosystem balance. The more you know, the more you can help protect plants and ecosystems in your own yard, neighborhood, and community!

Plant Heroes strives to spark curiosity about nature and science in all children. Our program provides hands-on, nature-based learning materials for educators to engage children in topics of plant health, ecosystem balance, and forest health. We also spotlight the amazing work our public gardens do in protecting the plants and ecosystems we all depend on through our website and printed materials. Visit **plantheroes.org** today to learn more!

Plant Heroes is brought to you by the American Public Gardens Association, founded in 1940. Over the last eight decades, the Association has supported the work of public gardens in North America and beyond. Our mission is to champion and advance public gardens as leaders, advocates, and innovators in the conservation and appreciation of plants. Our vision is "A world where public gardens are indispensable" as they provide botanic, conservation, community, education, and economic resources to their community.

The Association is committed to increasing the knowledge of public garden professionals throughout North America through information sharing, professional development, networking, public awareness, and research, so that they have the tools to effectively serve visitors and members.

American Public Gardens Association

PublicGardens.org

This publication was developed with financial support from the US Forest Service and the USDA Animal and Plant Health Inspection Service.

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