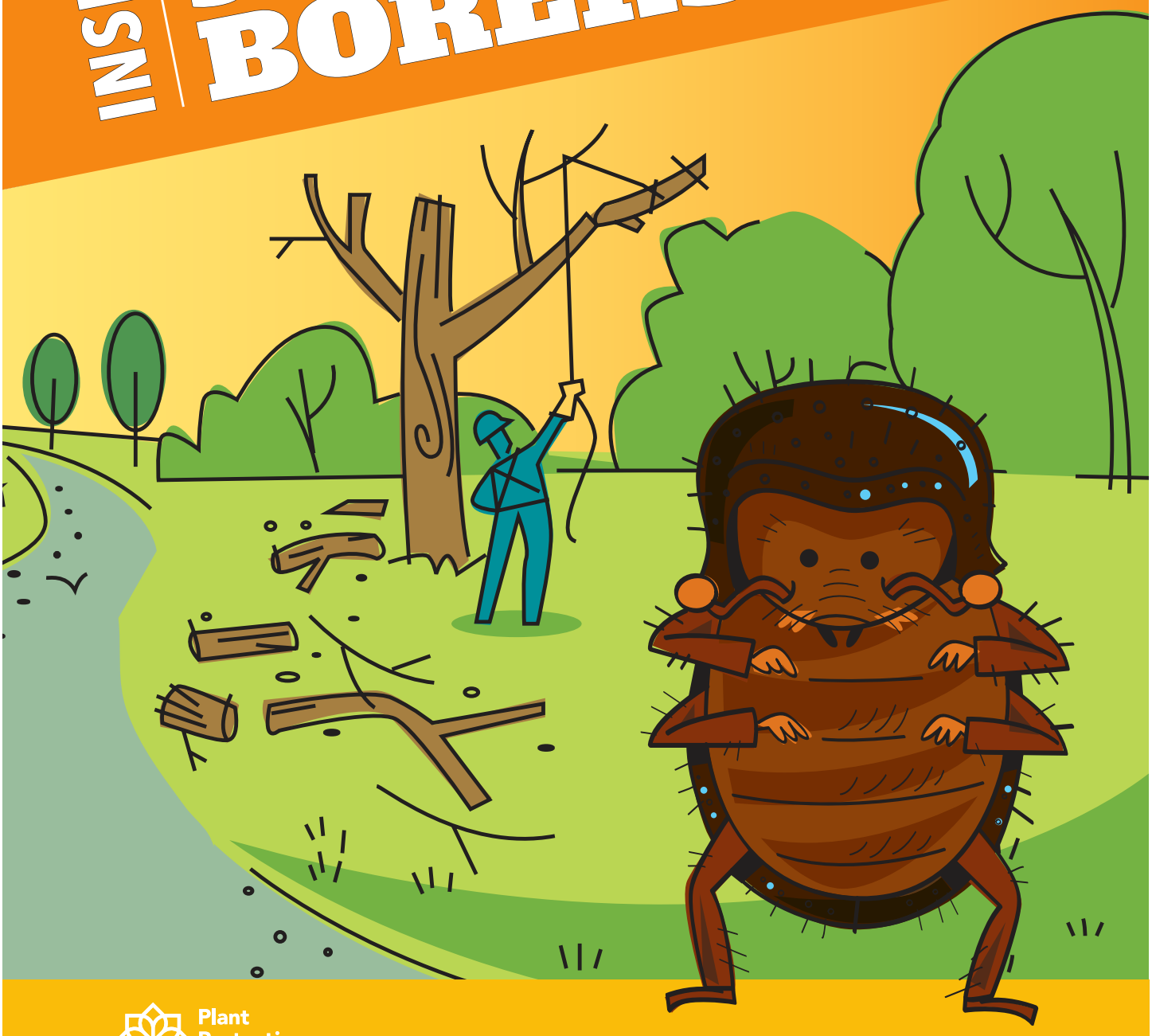
PLANT HEROES

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

INSECT | INVASIVE SHOT-HOLE BORERS | BEGINNER ACTIVITY BOOK

PLANTHEROES.ORG



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

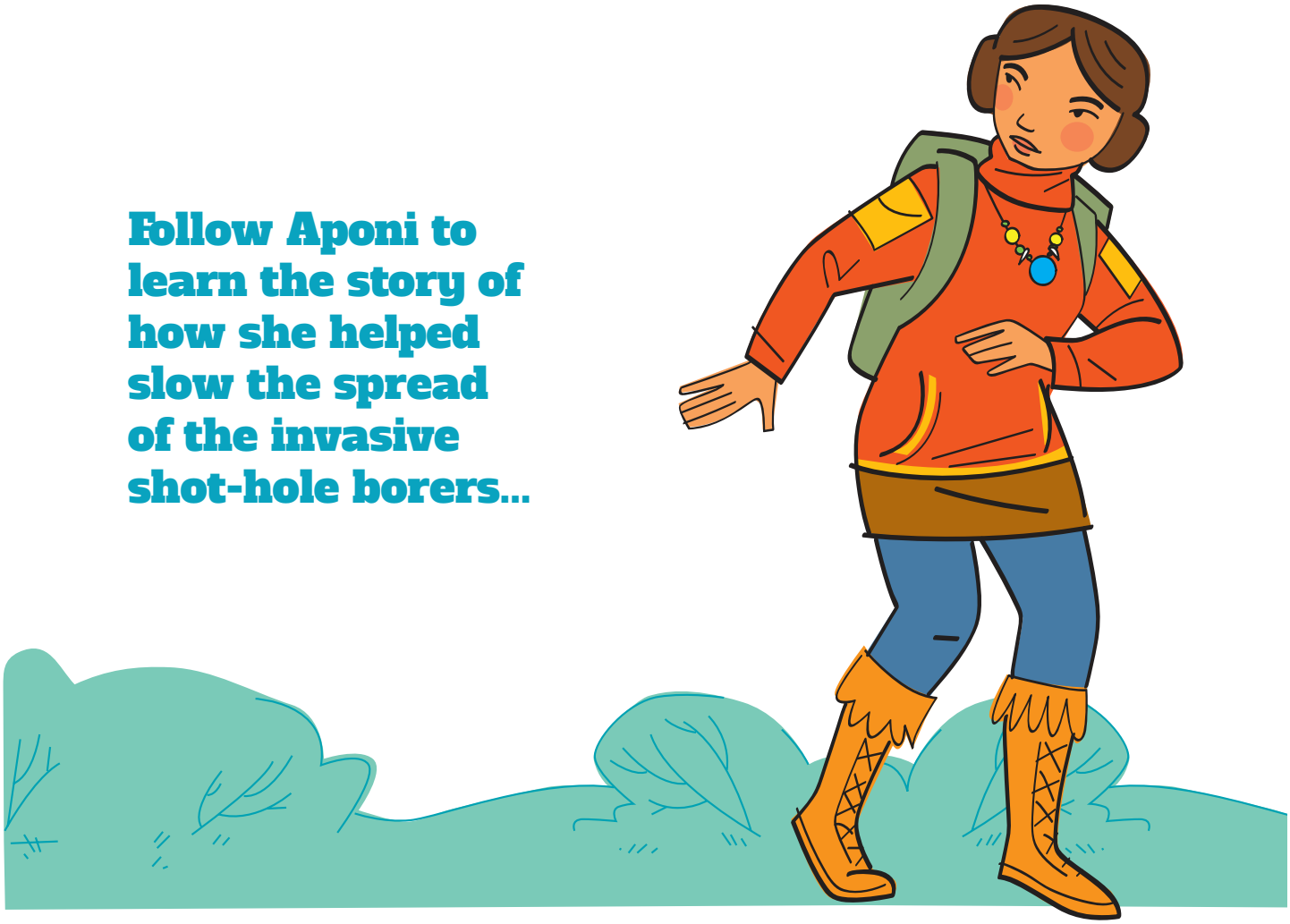
APONI STAR
From: Southeast Illinois
Hobbies: learning more about entomology (the study of insects)

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 can cause damage to existing organisms when it is introduced to a new environment.

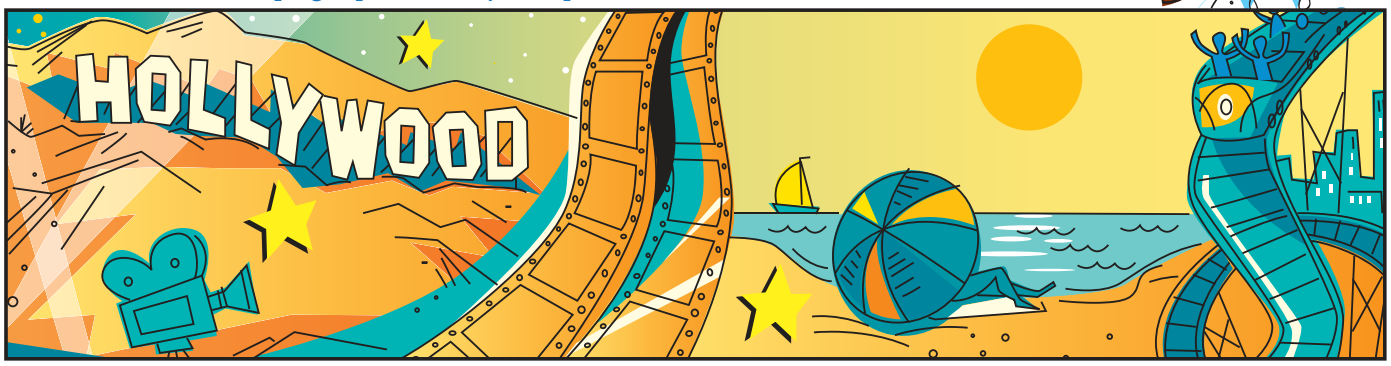
Follow Aponi to learn the story of how she helped slow the spread of the invasive shot-hole borers...



PLANT HEROES

CAMP SMART with SAFE FIREWOOD

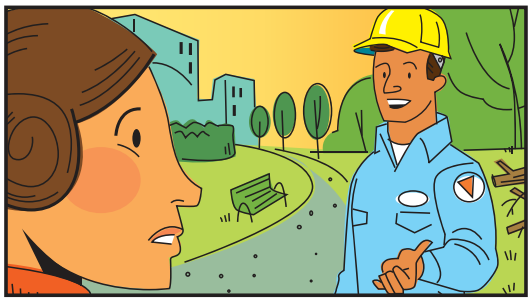
Aponi spent the entire summer with her cousins in southern California—amusement parks, movie stars, the beach... it's been a big adventure and they've decided to wrap it up with a weekend camping trip to a nearby state park!



The day before they leave, Aponi's uncle mentions that he saw a pile of wood on the curb in front of someone's house on his way home from work. "Maybe we could swing by on the way out of town and ask if we can take it for our campfire?"

Aponi remembers seeing some trees being taken down while they were visiting one of the nearby public parks a few weeks earlier ...

The groundskeeper explained that the trees were dying because they had been attacked by a tiny new beetle called the invasive shot hole borer.



She was amazed to see how TINY the beetle's exit holes were!

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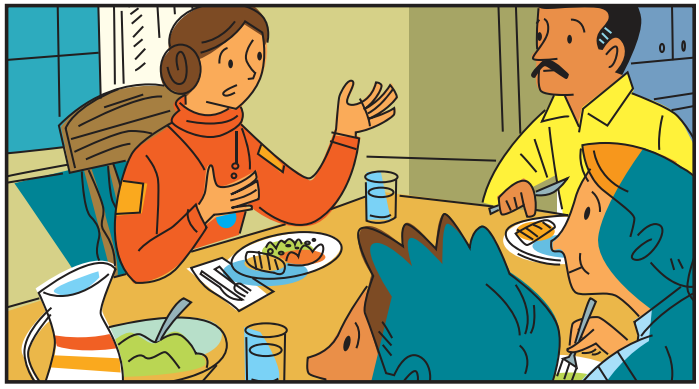
APHIS USDA FOREST SERVICE U.S. DEPARTMENT OF AGRICULTURE

HOLD ON!!

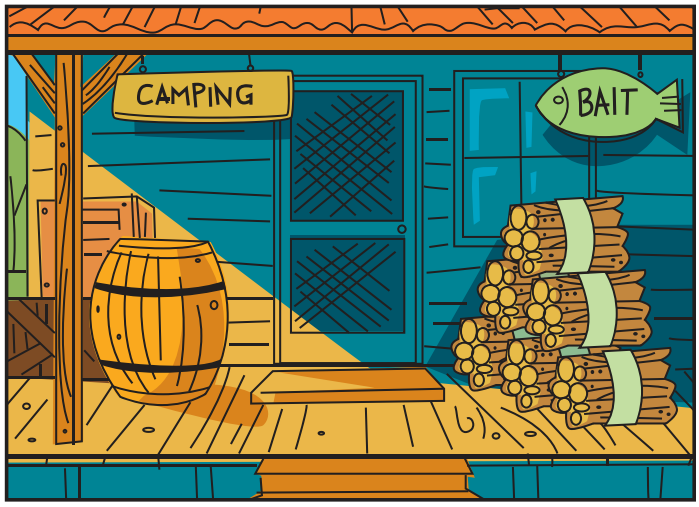
What if the pile of wood that you saw is infested with the same thing!?



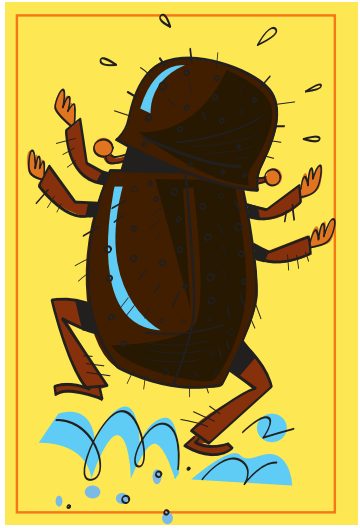
Aponi suggests that they look for heat-treated firewood instead, as that would kill any wood-boring insects.

The next morning they call the campground and the ranger gives them the name of a place nearby that sells heat-treated firewood.

They stop by the camping supply shop on the way to the park...



... and the owner points out the treated firewood label on each of the bundles. They know they've made the right choice!



That night, as they tell ghost stories around the campfire, they can all enjoy their s'mores even more knowing that they didn't introduce a dangerous pest to the forest.

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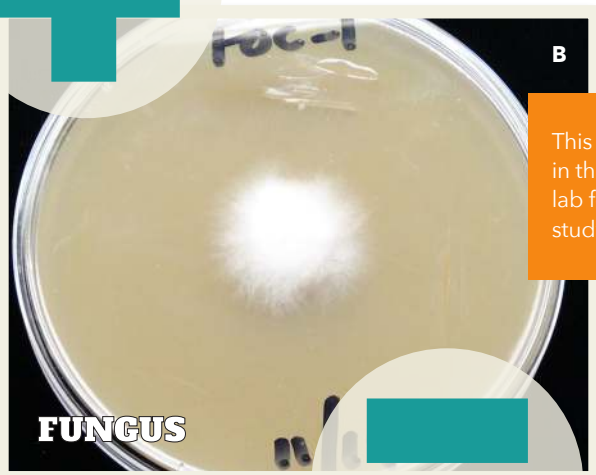
A Small Beetle and a Fast-Growing Fungus

The invasive shot-hole borer beetle is a teeny tiny beetle. It was accidentally brought to the United States from its home in Asia. It is not the beetle itself, but the fungus it carries, that can really hurt. The beetle carries the fungus inside special pouches in its mouth, and when the beetle chews tunnels into trees the trees are infected with the fungus.

WHAT IS A FUNGUS?

A fungus is a living being that is neither a plant nor an animal. Fungi feed on organic matter like an animal or tree. Some common fungi you might know include mushrooms and molds.

HANDY TIP: Fungi means more than 1 fungus; fungus means just one fungus.



This fungus was grown in this petri dish in a lab for scientists to study it more closely.

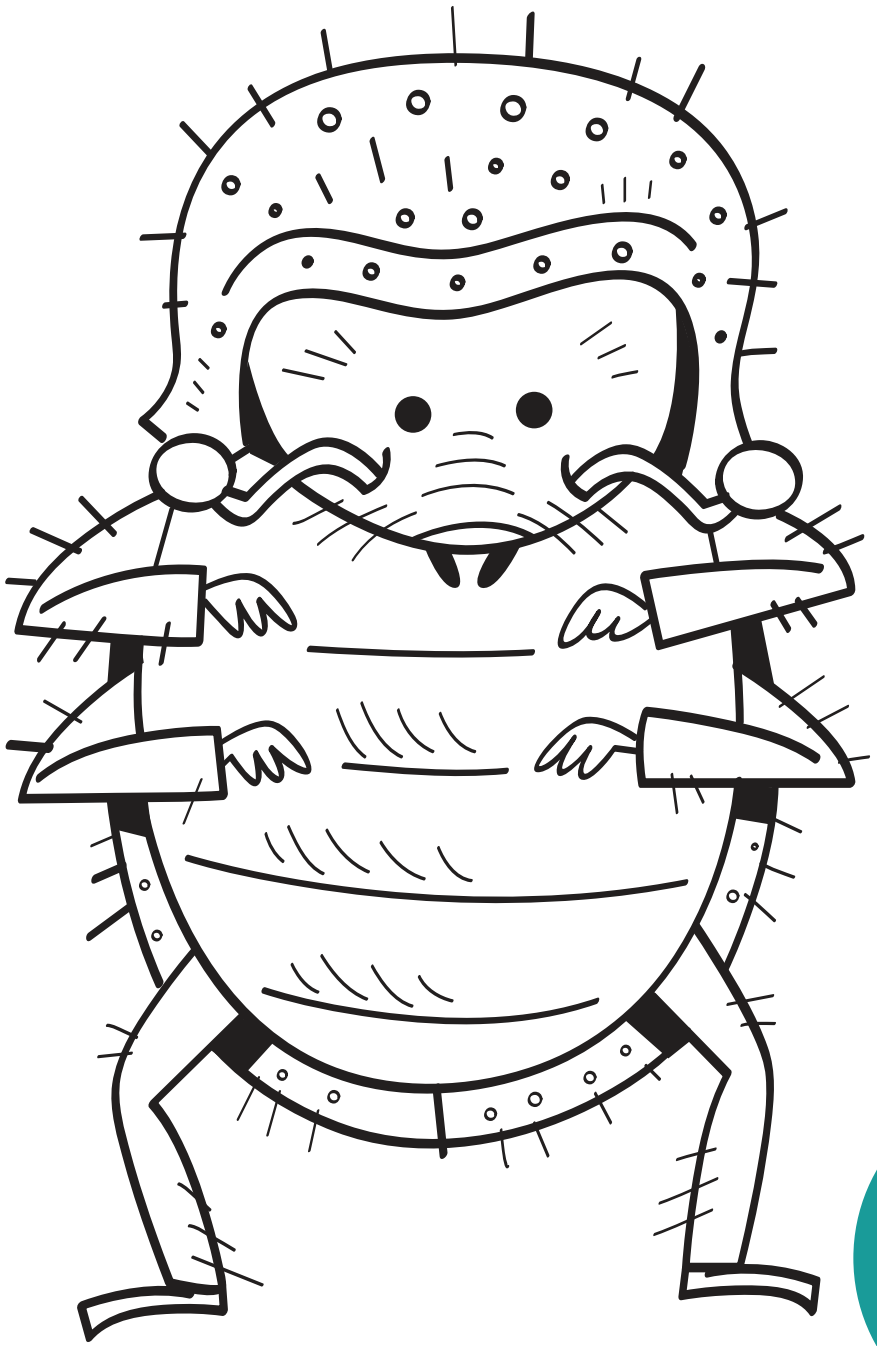
BE A SCOUT!

Look around in a park or garden near you. Can you find any fungi? They will probably be growing on rotting logs near the forest floor. **Be sure not to touch or eat any fungi you find outside–some fungi are very poisonous!**

PHOTO CREDITS: A: Matt Bertone, Flickr.com; B: Scott Nelson, Flickr.com; C: Akif Eskalen

The Beetle Behind It All...

It's hard to believe that a beetle smaller than a grain of rice can hurt a tree. Mature invasive shot-hole borer beetles are dark brown and shiny. These beetles are so harmful because many beetles attack a tree all at once. Color in the beetle below!



The beetle has four life stages: **egg, larva** (white worm-like stage), **pupa** (resting stage), and **adult.** To see photos of these life stages, visit page 3 of your field guide!

Trees in Trouble

Trees have several different ways of showing us that they are in trouble. The photos below show trees infected with invasive shot-hole borers. Use your detective skills and match up the descriptions with the photos they describe.

1

2

3

4

The tree produces sticky, oozing sap to stop beetles from coming in through the bark.

.....

The leaves on the tree turn brown because the tree cannot drink.

.....

When beetles come in and out of the tree, they leave very tiny holes behind, smaller than the tip of a pen.

.....

Some trees produce "sugar volcanoes" to try to stop the beetles from entering through the bark.

Why does the beetle carry the fungus?
The invasive shot-hole borer beetle feeds on a fungus that causes damage to trees. The mother beetle carries the fungus inside her mouth so that she can "plant" it inside the tunnels she bores so her eggs will have something to eat when they hatch!

PHOTO CREDITS: From top to bottom: Akif Eskalen; Akif Eskalen; Akif Eskalen; Erich G Vallery, Bugwood.org

The Beetle's Favorite Trees

Invasive shot-hole borer beetles only visit certain trees to raise their young. Learn more about the beetle's favorite trees! Match the tree with its correct description below.

AVOCADO

BOXELDER MAPLE

SYCAMORE

1

My seeds are called "samaras" and when they are carried by the wind they look like helicopters.

2

I have big, pointy leaves and my seeds form a very round and fluffy ball. What am I?

3

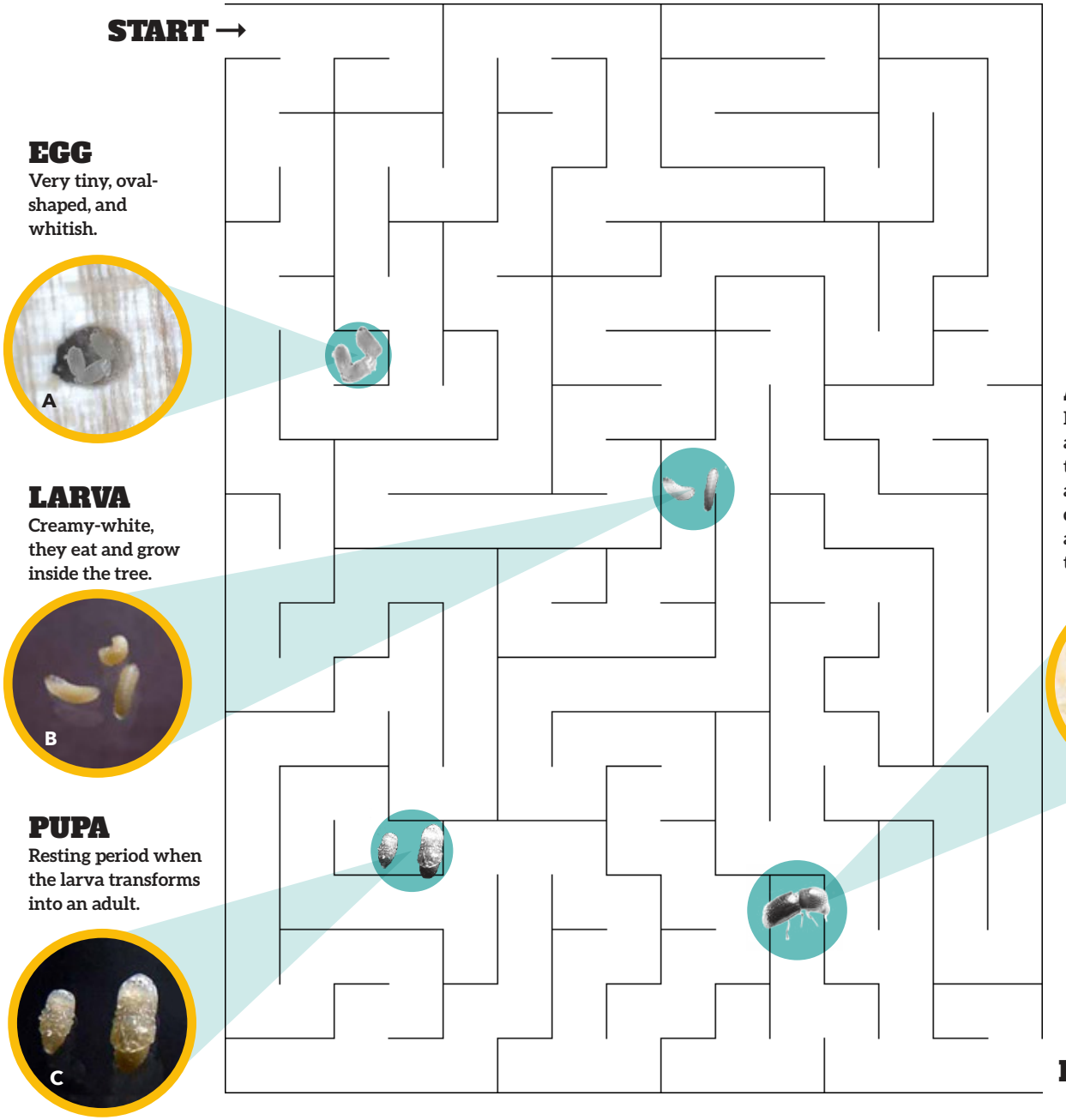
I have long, glossy leaves and a fruit that is used to make guacamole! What am I?

PHOTO CREDITS: Top to bottom: Chris Evans, Bugwood.org; Flickr.com; 5191080, Bugwood.org

Lifecycle Maze

Humans change as they get older. Did you notice that you get a little taller every year? Invasive shot-hole borer beetles lay eggs inside trees. The eggs hatch into larvae, they feed and grow inside the tree, then turn into pupae, and finally transform into adults and leave the tree. Follow the life cycle of the beetle through the maze to learn more!

START →

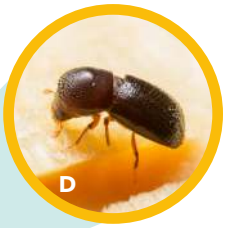


EGG
Very tiny, oval-shaped, and whitish.

LARVA
Creamy-white, they eat and grow inside the tree.

PUPA
Resting period when the larva transforms into an adult.

ADULT
Beetles take about one month to develop into adults. They are dark in color and have many translucent hairs.



FINISH

PHOTO CREDITS: A: Eskalen, ISHBeggs; B, C: ISHB, Euwallacea fornicatus; D: Matt Bertone, Flickr.com

Time to Journal

What I remember most about the invasive shot-hole borer beetle is

The coolest thing I learned in this book is

My favorite tree I want to help protect is

ANSWER KEY

Trees in Trouble: From top to bottom: 4, 1, 2, 3

The Beetle's Favorite Trees: Avocado: 3; Boxelder maple: 1; Sycamore: 2

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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