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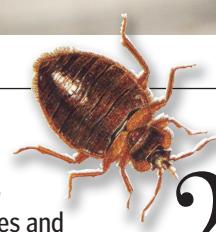
# INSECTS THAT BUG US

## INSIDE

**8** Wanted:  
Dead or  
Alive

**11** Field Guide  
To  
Your Bed

**18** Bugs,  
Beetles and  
Borers



**20** Invasion  
Of Stink  
Bugs

## An Integrated Curriculum For The Washington Post Newspaper In Education Program

## A Word About Insects That Bug Us

Aristotle and medieval writers refer to them. Attempts to eradicate them have failed as they have adapted and formed resistance. As bedbug infestations are making headlines and court appearances and their arthropod relatives have made an impressive infiltration into area residences, how do we know what we are dealing with? How do you recognize bedbugs, stink bugs, dust mites, silverfish, moths, termites, ants, fleas, beetles, crickets, and others with which we may cohabit?

*Post* writers report on seemingly harmless stink bugs, bedbugs that irritate, and ant infestations that dazzle some entomologists but prompt others to seek remedies. Another article relates the stories of borers and beetles that are attacking forests in a costly manner. After getting acquainted with the beneficial and harmful sides of this collection, activities encourage students to write about bugs, assemble a field guide, create wanted posters and prepare a public display case.

A reminder to *Post* INSIDE program teachers: If you plan to use articles in this guide in the e-Replica format more than three months after their publication date, remember to bookmark them. Also, teachers please note we have a new URL to download *Washington Post* INSIDE program online guides: [www.nie.washpost.com](http://www.nie.washpost.com).



**Lesson:** A study of arthropods and recent insect infestations has many interdisciplinary expressions. Beginning with observation and research, students may engage in scientific and journalistic writing and the creation of field guides, wanted posters and display cases.

**Level:** Mid to High

**Subjects:** Biology, Ecology, Health

**Related Activity:** Art, Economics, Journalism

### NIE Online Guide

**Editor** — Carol Lange

**Art Editor** — Carol Porter

**Contributing to this guide:** Lisa Lyle Wu currently teaches marine biology and is the lab director for the oceanography/geophysical systems lab at the Thomas Jefferson High School for Science and Technology (Alexandria, Va.). She contributed the wanted poster and field guide activities and provided feedback on resources found in this guide. As a freelance science writer, she has developed curricular materials for Discovery Channel and worked on exhibit development for the Smithsonian Institution's National Museum of Natural History. She contributed to previous INSIDE guides *Plankton — The Drifters*, *The Sea and Environmental Disaster*.

### Available Online

All Washington Post NIE guides may be downloaded at [www.nie.washpost.com](http://www.nie.washpost.com).

### Send comments about this guide to:

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**COVER IMAGES:** AP/Birmingham News, Iowa State University Entomology Department, U.S. Department of Agriculture, AFP/Getty Images; collage design by Carol Porter.

**COVER PHOTO:** Petri dishes containing bedbugs in the laboratory of entomologist Mark F. Feldlaufer who researches ways to kill bedbugs with various chemicals. Photo by Ben de la Cruz/The Washington Post.

An Integrated Curriculum For The Washington Post Newspaper In Education Program

## Insects That Bug Us

*Bedbugs, stink bugs, beetles and ants are covered in The Post articles reprinted in this guide. They have evolved complex adaptations and interact on multiple levels with humans. Teachers are provided with discussion questions, suggested activities and resources to enhance science, health, art, economics and journalism study.*

### Use the Vocabulary

Much of the vocabulary in the articles is related to science. Teachers may wish to review terms with students and ask them to use the words in sentences or short, informative paragraphs. Some of these terms include “arthropod,” “bug,” “entomology,” “infestations,” “insect,” “nest parasite,” and “species.”

### Don't Let the Bedbugs Bite

Metro science reporter Lena H. Sun reports on research being done in Maryland. Give students “Biting back when the bedbugs bite” to read. Teachers may wish to include these questions in discussion:

- How big is a bedbug?

- Sun uses such terms as “brown bug,” “scourge,” “blood-suckers,” and “household pest.” Which are descriptive terms? Do any of the terms carry a negative connotation? Do any of these word choices conflict with her being an unbiased reporter?
- Why do citizens, organizations and the federal government want to eradicate bedbugs?
- Why is it considered imprudent to spray insecticides in the main room where bedbugs are found?
- Categorize the approaches used to eradicate bedbugs.
- Why is propoxur considered an effective insecticide?
- What procedures are required

before a product, such as an insecticide, goes on the market?

### Focus on the Writer's Craft

Focusing on the writer's craft, teachers may wish to focus on the following techniques employed by Sun in “Biting back when the bedbugs bite”:

- Relates size of bedbug to a known object: See the first sentence and the photograph that accompanies the article.
- Provides historic perspective, especially that which relates to attempts to eradicate the bedbug, the current news peg
- Localizes the issue
- Transitions from an Ohio case study into current research
- Provides a human perspective on science research (entomologist Feldlaufer)
- Unites lede (description, lab and leading researcher) and ending (Feldlaufer's early study, description of blistered arm)

### Write About Science

“Abominable holiday hitchhikers,” an URBAN JUNGLE feature, illustrates the use of informational graphics to enhance the text. Discuss the three types of infographics that are used. Teachers should note the sources used by Patterson Clark to create the graphics.

## Bugs on the Web

[www.mayoclinic.com/health/bedbugs/DS00663](http://www.mayoclinic.com/health/bedbugs/DS00663)

### Bedbugs

Mayo Clinic provides definition, symptoms, causes, treatments and prevention

[www.ca.uky.edu/entomology/entfacts/ef636.asp](http://www.ca.uky.edu/entomology/entfacts/ef636.asp)

### Bed Bugs

UK Dept. of Entomology closeup on bed bug infestations

[www.youtube.com/watch?v=9kDcTcQo60M](http://www.youtube.com/watch?v=9kDcTcQo60M)

### D.C. DOH Bed Bugs

Informative video prepared by the D.C. Department of Health

<http://bugguide.net/node/view/15740>

### Bug Guide

Iowa State Univ. Entomology hosts guide; pictures and text

[www.orkin.com/learningcenter/pest\\_library/](http://www.orkin.com/learningcenter/pest_library/)

### Pest Library

Orkin entomologists give information to identify pests, their diet, habits and habitats; be sure to check “Other Pests”

<http://animals.nationalgeographic.com/animals/bugs/>

### Bugs

National Geographic collection: pictures, video, geographic locator and more



CONTINUED ON PAGE 4

## An Integrated Curriculum For The Washington Post Newspaper In Education Program

CONTINUED FROM PAGE 3

Ask students to use approaches discussed in Focus on the Writer's Craft and utilized in the URBAN JUNGLE selection when they write about an area of science. This may be based on a recent unit of study or a topic presented in one of the articles in this guide.

### **Make an Ethical Decision**

"Bedbug Decisions" presents scenarios based on situations reported in *Washington Post* articles. The situations found in Scenario 1 might be used with social studies, economics and ethics students. The Motel 6 example took place in 2002 and is considered one of the most famous cases in bedbug litigation. The siblings were awarded \$5,000 each in compensatory damages and \$186,000 in punitive damages. The appeals court affirmed the lower court's decision because of the "unfit for occupancy" statement.

In addition to the Federal Bed Bug Work Group summit to be held at Georgetown University Hotel and Conference Center, the D.C. health department will hold a summit on Jan. 20 for residents and organizations interested in prevention and eradication.

### **Face a Buyer**

The situation presented in the question posed to Benny L. Kass by a reader could serve as another case study for an ethical decision (See Make an Ethical Decision). Read to the class the opening question in "To tell or not to tell about the bedbugs nearby." Discuss their responses to the reader.

Once discussion is completed, provide students with copies of Kass's article. Compare and contrast their points of view with the

educated response of Kass.

Economics teachers will find this article an entry point to discuss economic dimensions of property ownership (maintaining the value of a major investment, potential equity loss, the influence of law and ethics on one's investments, impact of supply and demand on disclosure).

### **Create a Wanted Poster**

In addition to writing reports, news articles and columns, students could show their knowledge of arthropods by creating a wanted poster. Give students the "Wanted: Dead or Alive" handout for the introduction to arthropods and assignment guidelines.

Teachers may wish to use the wanted poster template that can be downloaded at <http://www.studentposters.co.uk/templates.html>. (Scroll down to the bottom of the page for the "Wanted" poster.) The free wanted poster template is provided in PowerPoint and Word format. Students add their own photographs or illustrations and text to create their posters. The information to be included on each poster is provided on the assignment sheet.

Teachers should stress that information on the poster needs to be accurate and clearly stated. Layout of the poster should be planned so information and illustrations do not "clutter" the space. Eye movement should lead from one area to the next information block. White space should be planned to balance text and photographs/illustrations.

Articles found in this guide could be used to illustrate how to locate information for the wanted poster.

Hang the completed posters around the room, along the hallway

CONTINUED ON PAGE 5

## **Online Fun with Bugs**

[www.ex.ac.uk/bugclub/welcome.html](http://www.ex.ac.uk/bugclub/welcome.html)

### **The Bug Club**

This is the AES Bug Club for young entomologists. From insect origami to a trade fair and experiments related to bugs. Advertised for students between 5-15 years.

[www.fortunecity.com/emachines/e11/86/rhythm.html](http://www.fortunecity.com/emachines/e11/86/rhythm.html)

### **The Chaotic Rhythms of Life**

Mathematical models and bugs. For the advanced student who really likes to use math and computers and think about what keeps cockroaches from taking over the world.

[www.bijlmakers.com/entomology/ne\\_simulation/ne\\_simulation\\_introduction.htm](http://www.bijlmakers.com/entomology/ne_simulation/ne_simulation_introduction.htm)

### **Simulate an Insect Population**

This page gives background information on a simulation model that was written to see how insect populations can be regulated by parasitoids, predators and other mortality factors. Links to everything from the butterfly effect to proverbs and insect quotations.

[www.ifungames.com/gameindex/evolution.htm](http://www.ifungames.com/gameindex/evolution.htm)

### **Evolution**

Just for fun. As if students don't play enough games already. Here is a game to drive them buggy! Grow, breed and care for beetles.

[www.ent.iastate.edu/misc/insectsasfood.html](http://www.ent.iastate.edu/misc/insectsasfood.html)

### **Iowa State University's Tasty Insect Recipes**

Link to a recipe for Banana Worm Bread or dry roasted crickets in Chocolate Chirpie Chip Cookies from the entomology department at ISU

## An Integrated Curriculum For The Washington Post Newspaper In Education Program

CONTINUED FROM PAGE 4

outside your classroom door, or in a display case to generate interest in arthropods.

### Display Your Findings

Having read articles and discussed the bedbug infestations, are your students ready to educate their school community? Do students, faculty and staff know the facts about bedbugs? Students could write articles for the student newspaper, prepare a podcast for the school's website and/or prepare a display case exhibit.

"Communicate in a Public Display" provides guidelines to organize a display case exhibit from the first idea through brainstorming and research to the final display.

Teachers should guide students through the four steps that are based on those used in museum installations. In Step One of the guidelines, students are determining what their school community needs to know. Once they have a concept, they need to brainstorm the best ways to communicate the information.

For example, if students want to show a) bedbugs are found in a bedroom, b) bedbugs can be identified, and c) there are reasons not to co-habit with a bedbug, teachers may ask students if they plan to:

- Create a scale model of a student's bedroom?
- Use a crib bed to illustrate?
- Include a video within the case?
- Begin with a nearly empty display case — perhaps pennies, socks and an open suitcase in the case with a few bedbugs present — and one sign asking, Where are the bedbugs?)? Then gradually add elements to illustrate places

to find bedbugs, text, and the life cycle of bedbugs as they multiply?

Students' responses to the above questions will lead to other questions, research and varied duties assigned to complete the display case.

Promotion is included as part of the project. Students need to consider ways to get viewers to their display case. After working hard to provide accurate information, they need an "audience" for their work. Students will use print, broadcast, online and social networking to communicate.

Teachers may ask for reports at the different stages of the project. These may include:

- A report of team members, duties assigned, concept to be developed
- A more formal, short research paper with a bibliography
- Design plans and schedule for completion
- A progress report
- A reflection on the project
- Ask for audience feedback

### Raise a Stink

Show students pictures of stink bugs. Are they familiar enough with them to identify them? What do they know about stink bugs? After this warm-up exercise, read "Invasion of stink bugs has homeowners, farmers seeking relief."

Discussion questions might include:

- What literary techniques does Lena Sun use to introduce the stink bug? (simile, size comparison to everyday item, description)
- Are stink bugs harmful to humans?
- How has the environment influenced the stink bug

### Emulate Nature's Best Ideas

[www.biomimicryinstitute.org/](http://www.biomimicryinstitute.org/)

#### Biomimicry Institute

From fear factor to wow factor — biomimicry is the science and art of emulating Nature's best biological ideas to solve human problems.

Biomimicry makes an interesting addition to your discussions in class about insects. Insects have served as models in several case studies. For example, did you know that by studying the nano-scale structures of butterfly wings scientists have developed non-toxic paints, fabrics and cosmetics?

Did you know sustainable buildings in Zimbabwe have been modeled after studying the self-cooling mounds of termites that can maintain temperatures within their nests to one degree while temperatures outside the mound can change from 3 to 42 degrees?

Who would imagine that refugee camps in the future might have unending supplies of freshwater with no pumping or importing? Synthetic surfaces mimicking a beetle may make it happen. The Namibian Beetle, a resident of the southwest coast of Africa, obtains all the water it needs by catching droplets of water from fog moving in from the ocean. Bumps on its external covering attract moisture from the fog while the water-repelling forewings direct the condensed water droplets into channels leading to its mouth.



CONTINUED ON PAGE 6

## An Integrated Curriculum For The Washington Post Newspaper In Education Program

CONTINUED FROM PAGE 5

population and behavior?

- In what ways has the stink bug adapted to metropolitan D.C.?
- Who may consider stink bugs harmful? Why?
- What are the most successful ways to eradicate stink bugs?

After reading the article, give students one or more of the following tasks to complete:

- You are the owner of a peach orchard. Write a persuasive letter to the leader of the Brown Marmorated Stink Bug Working Group. What behavior of the bug can you document? Teachers, note that Tracy Leskey is identified in the article. Students should use appropriate business letter format.
- Do research on animals that have been introduced into an ecosystem to control an unwanted animal population. Have these attempts been successful? Write a letter to the editor. Based upon your research, would you support the introduction of the stink bug's natural predator into the U.S.?
- Build a better stink bug trap. Do more reading on the effective means being used to trap and/or eradicate stink bugs. What would be your solution to a better stink bug trap? Describe the device and draw an illustration of it.

### Prepare for Ants

"That Antsy Feeling" is a summer article that relates the persistence of ants to locate food and the pro-con of ants in homes. Teachers may wish to use this article to prepare students to observe their school and home environment for the appearance of the first ants of the year. After students read the article, questions for discussion may include:

- How many ant species exist?
- Are ants harmful to most humans?
- What are the benefits of having ants in one's home and yard?
- Which ants might cause damage? Indicate the kind of damage they do.
- What environmental and ecological conditions are ideal for ants to flourish?
- Explain how ants locate food sources.
- What are the best ways to get rid of ants in the house?
- Are humans likely to exterminate all ants? Should they?

After reading and discussing the article, ask students to write a short, informative piece for the student media — newspaper, online news, podcast or broadcast. They may select the theme of the piece. For broadcast students, this could be one 30-second PSA in an environmental awareness series.

### Furnish a Field Guide

Students are either fascinated by insects or they want to squash them. Yet almost all are thrilled by finding a bug they haven't seen before. Take this opportunity to encourage observation, the first step in doing science.

Give students "Create a Field Guide to What Lives in Your Bed ...." Through this activity, students learn how to collect and identify insects and develop a brochure on the specimens. For additional details on creating a tri-fold or a step-by-step guide, go to <http://www.computercompanion.com/LPMArticle.asp?ID=143>.

This is an indoor activity that can be adapted to the outside. It can introduce ecology, animal behavior, adaptations, biodiversity, and the scientific method. ■

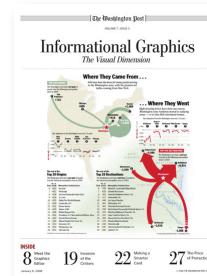
## Past Post Guides

### *On the Brink — Threatened and Endangered Species*



Illustrations of threatened and endangered species in the Washington region. Guide includes case studies, activities and resources.  
March 12, 2009

### *Informational Graphics — The Visual Dimension*



How The Washington Post News Art department creates maps, charts and informational graphics that help readers comprehend stories. Each type of graphic is illustrated.  
January 1, 2008



Museum Musings  
Guide includes steps to create an exhibit from concept to wall text and press release.  
September 11, 2007



Insect Habitat  
Introduce your students to the world of insects, their collection, display and identification using dichotomous keys.  
October 9, 2001

## Bedbug Decisions

As reported by *Post* reporters Lena H. Sun and J. Freedom DuLac, bedbugs are on the return. The common bedbug, *Cimex lectularius*, was nearly eradicated in the U.S. in the 1950s when DDT use was allowed. Its use was banned in the 1970s. The apple-seed-size insect has returned since the late 1990s.

Experts attribute the rise in bedbugs to increased domestic and international travel, lack of knowledge about preventing infestations and increased resistance to pesticides. Bedbugs hitch rides easily from person to person. Unlike many household pests — ants, termites and cockroaches — bedbugs can live for months without a meal.

### 1 Scenario

"Bedbugs are showing up everywhere: in college dorms, government buildings, Google's offices — even luxury hotels such as the Waldorf-Astoria, which has been sued by guests who say they got chewed up at the New York landmark." ("Md. lawyer helps bedbug victims bite back," J. Freedom DeLac, November 28, 2010.)

You are a lawyer in a firm that specializes in product liability, malpractice and toxic tort cases. You are developing a new niche — bedbug complaint suits. Your firm could collect 33 to 44 percent of any settlement or judgment in cases.

Look at the following situations where bedbugs have been found from the perspective of the owner, manager, individual affected and your professional interest in the case. Should a suit be filed?

- In Honolulu, paramedics had to decontaminate ambulance interiors and equipment. This has added expenses to their business and places future patients and hospitals that receive bedbug-carrying patients in jeopardy of contact. Should the ambulance service sue a patient whom they suspect of being a bedbug carrier?
- A high school teacher has "scars up and down her arms" from bedbugs. Her apartment complex has been treated several times by exterminators, but the infestation remains. She is seeking \$100,000 in Baltimore County Circuit Court for "embarrassment, mental and emotional distress."
- A family of six keep their Maryland apartment very clean. They want to sue their landlord \$400,000 in compensatory damages and \$3.15 million in punitive damages over a bedbug problem at their apartment complex.
- During a two-night stay in a Motel 6 in Chicago, two siblings were "attacked by bedbugs." They have found out that the motel management had designated the room "unfit for occupation until an exterminator could treat it." The front desk gave them the last available room.

### 2 Scenario

Lena Sun reported that the Federal Bed Bug Work Group will host its second national summit Feb. 1-2 in D.C. Attendees will focus on ways the federal government and others can work together to manage and control the pests. With the increasing presence of bed bugs in movie theaters, office buildings and retail stores, according to officials and pest management companies, methods of control and eradication must be found.

The summit is open to the public. Prepare a presentation to make at the summit. Is this the job of the federal government, states, property owners and/or citizens? What do you propose to solve the problem?

# Wanted: Dead or Alive

Arthropods represent one of the largest phyla in the animal kingdom. Entomologists estimate that there are perhaps over 8 million different species of insects on Earth, although not all have been named. Emerging over 400 million years ago, they have evolved complex adaptations that enable them to be distributed worldwide in almost every terrestrial environment. They have evolved complex interactions with other members of the plant and animal kingdoms, including humans.

Although we often associate bugs with the “fear factor,” we couldn’t survive long on this planet without them. They pollinate crops, control insect pests, and return nutrients to the soil. Their burrows aerate the soil and their droppings fertilize the soil enriching it with nutrients thus benefiting plants. Insects are valued in some cultures as food, used for medicinal purposes, and even aid forensic scientists in crime scene investigations. Yet they can decimate crops and forests, carry diseases, destroy wood, and are our biggest competitor for food. Clearly, they are the good, the bad, and yes ... the ugly.

## Objective

The objective of this assignment is to use the Internet, books, journals, and news articles (such as those found in *The Washington Post*) to compile knowledge about certain bugs that have made the news lately. These are bugs that you have heard of, but perhaps don’t really know what makes them “tick.” (That’s not an insect by the way!)

After you have collected information on these “critters,” share this information by creating a “Wanted Poster.” Your poster, should inform your readers about these notorious, most sought-after insects (both their good and not-so-desirable traits) and make them want to hunt down more information about them. Wanted bugs include bedbugs, stink bugs, Asian gypsy moths, emerald ash borers, and Asian long-horned beetles.

## Sample Poster



## Include the Following Information on Your Poster

- Common and Also Known As names (aka scientific name)
- Habitat, natural range
- Life cycle (include their aka life cycle stages)
- Role in food chain
- Impact on humans
- Current research being conducted related to them
- Interesting features and/or actions
- References used (should include recent articles and no encyclopedias)
- A photograph or an illustration, as well as sketches or a graphic of their life cycle stages with labels. Be sure to include a credit for any graphics used.

# Communicate in a Public Display

## **STEP ONE:** *Conceive the Display*

You need to be clear in your purpose and concept before working on presentation details.

### **Form Teams**

The display that you create should reflect the collaboration of all members of the team.

### **Define Your Concept**

Each member of the team should write a page introducing the main ideas he or she thinks are most important to communicate the team's topic.

Share these ideas. Discuss how the concepts interrelate and which should become the focus of the exhibit the team will prepare. Determine what you know and what you need to know before finalizing your display.

### **Brainstorm Approaches**

Now that you have a focus for your display, generate ideas for presenting concepts in concrete form. Will your display be complete on day 1? Or will your display change daily or weekly? Is your message better served by drawing viewers back to the display to see the changes and to understand the dynamics involved? Will this be communicated by adding or subtracting elements from the display?

## **STEP TWO:** *Develop the Display*

You know what you want to convey to your viewers. Verify information. Plan details.

### **Research**

Verify the depth, width and height available for your finished project.

Understand your topic. Do more research, if needed, to know your particular focus in depth.

### **Sketch and Prepare Specifications**

The draft of the display should be done to scale.

You may use any combination of pencil sketch, computer-assisted graphics or foam-board models to work out the size, number and placement of objects; staging and materials; and overall style. The entire display case should be utilized.

Prepare a specifications sheet for the team to follow. This will include fonts to be used in signage, labels and graphics and the word range in each. Plan placement of text, illustrations, credit and display items so they can be easily read by the audience.

### **Assign Duties**

From concept to staging, make a list of all the tasks that need to be done in order to create and maintain the display. Make sure every member of the team has a task to complete. Among the duties may be greeting visitors, answering questions and clean-up.

## **Step Three:** *Execute the Display*

You want to educate your audience. Communicate your display concept by writing clearly and selecting or building the most appropriate artifacts.

### **Write and Prepare Signage**

Audiences should be able to read all text from three feet. It should clearly draw your audience to the artifacts and provide new insight into your concept.

Exhibit title and signage titles should be complete sentences — not labels.

Think before you write. Brevity and conciseness of text are essential. Although different team members will write text, all signage must read as one voice.

### **Build or Locate Display Items**

Common objects can be seen in a new perspective — use them

Use carefully selected photographs, illustrations and artifacts that create a three-dimensional display. Consider the best materials to present objects at different heights and depths.

### **Prepare a Schedule**

In order to meet the deadline for the display's presentation, plan a work schedule. Be sure to give enough time for proofreading and set up of the display.

## **Step Four:** *Stage the Display*

You want to promote your exhibit opening to a wide audience. Use old and new media.

### **Photograph Your Display**

Take photographs from different angles. Show the whole and parts of the display. You will use these images for event posters, newspaper articles and advertisements, Soundslides, blogs and other avenues of promotion. These photographs will also be used in your final assessment of the project.

### **Promote Your Display**

Let people know where and when they can visit your display. Use your school's daily announcements, school media and Web page. As media designer Darren Milligan stated, "Helping people to learn and then to share what they have learned is exactly what the Smithsonian is about." And it is what your display is about.

# Create a Field Guide to What Lives in Your Bed ...

*Sleep tight, don't let the bedbugs bite ...* We have all heard that expression, but probably didn't take it literally. Could it be true that when we drift off to sleep, their fun just begins? Recently, bedbugs and their arthropod relatives have made an impressive infiltration into area residences. So, how do we know what we are dealing with? How do you recognize bedbugs, stink bugs, dust mites, silverfish, moths, termites, ants, fleas, beetles, crickets, and others with which we may cohabit? What do they feed on, what attracts them, are they harmful, can they be useful, how do we get rid of them? What we need is a field guide to what is traversing the landscape of our pillows, comforters, sheets, and box springs.

## **Creating a Field Guide to What Lives in Your Bed or Other Nearby Places**

This field guide will be an informational, tri-fold brochure that you can create easily in a word document by just selecting a landscape view and using the columns feature. Don't feel restricted only to exploring your bed. You could design a brochure for exploring anywhere or everywhere in your residence.

## **Creating a Collection**

### **Literature Safari: Background Research**

If you were an entomologist, working in the field, you would need to be able to distinguish between the critters that you collect. So ... that means you need to collect some critters.

First, do your background research by reading some current articles related to potential insects that you may want to hunt or that you may come across as you search for other specimens. Take notes and be sure to reference where you find the information so you can refer to it later.

It is important to know what you are dealing with. Protect yourself from bites or mites, fleas, bedbugs and other critters you may encounter. If you are allergic to insect bites, have someone else do the collecting with you. This information will come from your background research in news articles, journals, and insect guides. Make a note of potential specimens to collect and note any precautions that should be taken.

### **Insect Safari: Leave no bug behind ...**

Once you have prepared with your literature search and have a list of potential insects and places to find them (beds, closets, clothes, houseplants, light fixtures, basements, pet beds, vents, drains, the glue that holds furniture together, old boxes, books in the attic), create a data sheet for each specimen. Gather materials that you will need to collect specimens.

Your data should include the following information: specimen number, the address of the collection, specific location within the home, date collected, time of day, order name, common name, behavioral observations at time of collection. Careful observations are key in scientific fieldwork, so take some time to observe and record the behavior of any specimen that you find. If you are working with a partner, one could take a photograph and the other record observations. Taking a few moments to observe the behavior of the insect before capturing it will help in identifying it later on. This might include behaviors such as:

- Was it flying?
- Is it eating?
- How was it flying?
- What is it eating?
- How does it fly?
- How was it interacting with other species or was it alone?
- Was it stationary or crawling ?
- Was it with members of the same species or was it with different species?

## Create a Field Guide to What Lives in Your Bed ... | *Continued*

Insects are a class in the phylum arthropoda. The order and common name of the specimen will need to be determined later with more detailed observations. You may want to create an index card for each before you begin the collection.

To collect insects you need a clean, wide mouth jar — peanut butter jar, margarine container, and baby food jar work well. You can often catch bugs by placing the jar or container over them or have the jar in one hand and the lid in the other to scoop them up. Once you have located and observed the insect, place the jar over it to trap it, taking care not to let it escape. Then carefully transfer the insect to a plastic bag for temporary storage. A pair of forceps or tweezers helps in handling them.

You may need to modify your collection technique along the way depending upon where and what is being collected. Each plastic bag should be numbered and a record made so that you have the required information for each. There are several ways that you can store bugs but the idea is not to create a living flea circus. Your collection will need to be preserved.

### **Preserving Your Specimens**

Entomologists have many methods to collect and preserve insects. Here are three methods to preserve the insects you collect.

1. If the insects have a hard body like a beetle they can be placed in a plastic bag in the freezer for 48 hours. Be sure to let your parents know about your project and have everything labeled.
2. For insects that are more fragile, like moths, you can place them in a tightly closed jar with cotton balls that have been soaked with nail polish remover. The ethyl acetate is a clear liquid and the fumes will euthanize the insect. It is also flammable so keep it away from open flames. Don't use too much or the liquid will discolor the insects. Only the fumes are necessary. This method works quickly. The insects can then be transferred to a labeled plastic bag for storage. Specimens can be kept for a month in the freezer. Take care not to damage them. Good specimens will not be missing appendages!
3. Ethyl alcohol, 70% dilution, can be used in jars if the insect is too small to be pinned. This should be obtained from the teacher. Isopropyl rubbing alcohol from the drug store is not recommended.

### **Identifying Specimens**

Using insect guides, dichotomous keys, the Internet and magnifying glasses, identify your specimens. Take photographs or sketch your specimens to use in your field guide.

### **Creating a Display**

Find a box or simple board to display your collection. Cigar boxes and shoe boxes work well and can be lined with Styrofoam material, corkboard or cardboard. Insects can be pinned to the board or box for display. Include identification keys or neatly labeled identification cards using the information you recorded for each.

### **Creating the brochure**

Now, take your sketches, pictures, background information and create an informational brochure on what lives in your home. Look at samples of brochures and field guides. Be creative but be accurate with scientific information. This should be interesting. Include each bug or concentrate on just a few. You might make your own dichotomous key to help others to identify the insect. Other possible ideas are to organize the bugs according to where they were found, include life cycles, their role in the ecosystem, current articles related to them or if they are being used in research.

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# Biting back when the bedbugs bite

BY LENA H. SUN

*Washington Post Staff Writer*

• Originally Published September 6, 2010

The brown bugs, each about half the size of a pencil eraser, lie in glass petri dishes — a few on their backs, legs in the air. They died within seconds of scurrying across a piece of paper containing drops of a chemical. The next step is to find out whether that same piece of paper will kill insects that crawl over it two, three or four months from now.

This lab is the front line in the federal government's chemical warfare on a scourge that has become resistant to many insecticides and is raising anxiety — and welts — in bedrooms, college dorms and hotel suites across the country: bedbugs.

Among those leading the attack is Mark F. Feldlaufer, an entomologist at the Invasive Insect Biocontrol and Behavior Laboratory on the Agriculture Department's sprawling research center in suburban Maryland. His mission is to find compounds that kill the bloodsuckers, which have made such an itch-inducing comeback in recent years that the U.S. Centers for Disease Control and Prevention and the Environmental Protection Agency issued a joint statement last month noting their "alarming resurgence."

A common household pest for centuries, bedbugs were virtually eradicated in the 1940s and '50s by the widespread use of DDT. That insecticide was banned in the 1970s, and the bugs developed resistance to chemicals that replaced it.

Unlike many other household pests — ants, termites and cockroaches — bedbugs can live for months without a meal, hidden deep in mattress seams, box springs and baseboard crevices, behind wallpaper and in clutter around beds,



PHOTO BY BEN DE LA CRUZ/THE WASHINGTON POST

**Scientist Mark F. Feldlaufer pours blood into a feeding apparatus for bedbugs at his laboratory at the Agriculture Department. His mission: find compounds that kill the bloodsuckers.**

making it hard to spray them. And they travel easily, hitchhiking from person to person, apartment to apartment, city to city.

Getting rid of them, experts say, has become a complex political and social problem, not only because of modern concerns about pesticide use but also because of Americans' mobile lifestyle.

"People don't even have time to check their doggone phone messages," said Michael Potter, an entomologist at the University of Kentucky, much less inspect mattresses for brown specks of feces, a telltale sign of an infestation. People also have more possessions, and all that clutter makes for great places for bugs to hide.

And rightly or wrongly, it is considered imprudent to spray insecticides in areas around the bedroom, he said. That means pest control companies are often unable to get rid of all the bugs at once. Return visits increase homeowner costs, and

also risk increasing the bugs' resistance to insecticides.

Funding is limited for the kind of work the USDA's Feldlaufer is doing. Research on the public health effects of the bugs has not received much support because even though their bites can provoke allergic reactions, unlike ticks and mosquitoes they are not known to spread disease.

Nontoxic measures to fight the pests include encasing mattresses and box springs and washing clothes in hot water and running them in a dryer on high heat. But mattresses and couches can't be put in a dryer, and heat-treatment technology in apartment buildings is hugely expensive, experts said.

"It's the biggest pest problem we've encountered in several generations," said Bob Rosenberg, vice president of government affairs for the National Pest Management Association.

CONTINUED ON PAGE 14

## An Integrated Curriculum For The Washington Post Newspaper In Education Program

CONTINUED FROM PAGE 13

**More bedbug complaints**

In Baltimore, calls about bedbugs to the city's 311 line jumped from two in December 2008, when the city began tracking them in earnest, to 92 last month.

Washington is also seeing a big increase in calls to 311 and the health department, with the number this year — 257 — on pace to more than double last year's total, officials said.

Traditionally, complaints come from multi-unit dwellings, but the past three months have seen spikes from single-family homes and visitors who stayed in District hotels, they said.

In Ohio, infestations are so severe that Gov. Ted Strickland (D) made two appeals to EPA Administrator Lisa P. Jackson.

"The bedbug problem has created a very real physical, emotional and economically devastating situation for many Ohioans," the governor wrote in a June 30 letter.

One Dayton apartment complex owner spent more than \$280,000 in an attempt to destroy the pests, he noted.

Another hired an unlicensed pesticide applicator who saturated the inside of an apartment complex with a pesticide, resulting in tenants being treated at a hospital for chemical exposure.

Strickland would like Jackson to approve the use of an insecticide that is banned for residential purposes. The chemical, propoxur, is widely used to kill cockroaches and lawn pests.

**Researching solutions**

Although many insecticides are approved for use against bedbugs, the great majority contain pyrethroids, a class of chemicals against which the pests have developed rampant resistance, entomologist Potter said.

Potter's research has found propoxur, which belongs to a more toxic class of pesticides known as carbamates, to be effective because it does not rely on direct contact but remains potent on

surfaces where bugs crawl even after it dries. The chemical had been approved for use against bedbugs since the 1960s. But manufacturers withdrew it from residential use in 2007 after the EPA found that indoor uses posed risks to children.

Pyrethroids and carbamates both disrupt bedbugs' nervous systems, but in different ways. University of Kentucky researchers have found that the bugs have developed resistance to pyrethroids in several ways, including breaking down the toxin with enzymes before it reached its targets.

An EPA official said the agency is evaluating more data to find out whether propoxur could be used in a more limited way than Ohio has requested.

The EPA, which held a bedbug summit last year, is now leading an interagency task force on the pests that includes the CDC, USDA, Department of Housing and Urban Development and the Defense Department.

**Seeking a fast fix**

Until a month ago, Feldlaufer and other scientists at the USDA had been focusing on synthesizing new compounds to kill bedbugs. But even if a new chemical were effective, bringing it to market would take much longer because of safety testing. A faster solution would be to look at chemicals already used to treat agricultural pests, where safety data have been established, and determine whether those could be used to control bedbugs.

Hundreds of such pesticides exist. The EPA and USDA are working together to come up with a list for testing, ranked in order of those most likely to get a green light for indoor use, officials said.

But no new chemical would be a magic bullet. To fully eradicate the pests, there



PHOTO BY BEN DE LA CRUZ/THE WASHINGTON POST  
**Bedbugs are difficult to spot and can live for months without being fed. Several are shown here next to a penny.**

needs to be a coordinated approach that includes vacuuming, decluttering and sealing cracks to remove hiding places.

To raise public awareness about the bedbug problem, Baltimore officials have conducted door-to-door campaigns in affected neighborhoods. In the District, health officials put together a five-minute video about bedbugs that airs daily on Channel 16 and is also on the city government's Web site.

Feldlaufer hopes the new urgency will help him get more insecticide-resistant bugs to test. At his Beltsville lab, his 18 mason jars hold tens of thousands of bugs that feed on expired red blood cells (from Walter Reed Army Medical Center) that he mixes with plasma. But only two jars contain the pyrethroid-resistant ones.

His personal hope is to avoid getting bitten by the bugs ever again. He has become extremely allergic to them.

When he was a graduate student, he let dozens feed on his forearm while researching bedbugs. He developed a mild rash but didn't worry much about it. Fast-forward to two years ago, when as a longtime USDA entomologist he took up bedbug research again. He received a collection of the pests from a leading expert and decided to let them feed on his arm again.

This time, his arm swelled and reddish blisters bubbled up. "Boom — after 10 seconds, I got that reaction, even though I had not been exposed in nearly 30 years," he said.

A photo of his blistered arm is featured in a USDA poster about bedbugs on the wall outside his lab. It's a personal reminder of his professional mission. ■

*Staff researcher Madonna Lebling contributed to this report.*

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### Abominable holiday hitchhikers

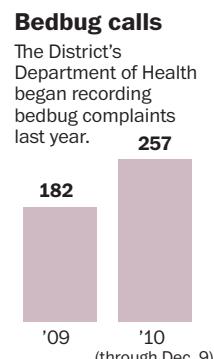
Before nestling into unfamiliar beds, seasonal travelers may want to acquaint themselves with the habits of a resurgent pest.

**Bedbugs** almost disappeared in the United States in the last half of the 20th century, with most of us knowing them only as dark characters from this bedtime rhyme: "Good night. Sleep tight. Don't let the bedbugs bite."

Easier said than done now that bedbug infestations are rising at an alarming rate. Some experts surmise that an increase in travel, lapsed public control programs and the bug's resistance to pesticides may be to blame.

These "human nest parasites" mostly stay hidden in cracks and crevices until the early morning hours, when they emerge to scurry over their hosts, stealthily piercing the skin with their long beaks to gorge on blood. Bites often appear as rows of red dots, which may swell into itchy dermatitis — but some people never know they've been bitten.

People can pick up bedbugs while traveling, potentially introducing bugs into their homes. Bedbugs are notorious for crawling into luggage, clothing and books, where they'll hitch a ride to a new locale.



Should you discover bedbugs in your home, "the first rule is don't overreact," says Eddie Connor, manager of Connor's Pest Control in Springfield. Two actions can further spread the bugs, he says: "Moving furniture to another room is a bad idea. That will only spread the problem." The other misstep: using bug bombs to try to kill the bugs. "Those can be dangerous and ineffective," Connor says. An Environmental Protection Agency Web page agrees: "Foggers and bug bombs do not control bedbugs."

Connor's solution is one that a growing number of pest-control services are finding effective: dogs and heaters.

Highly trained canine search teams have proved to be 98 percent accurate in confirming and pinpointing the extent of an infestation. Connor uses small, energetic dogs that are able to navigate behind and under furniture. His company's beagle, Jack Russell terrier and puglie can each search as many as 130 rooms a day.

Once an infestation is mapped, rooms are vacuumed and the contents are arranged so that heaters boosting the room's temperature to about 134 degrees for three hours will penetrate bedbug hiding spots and kill the suckers.

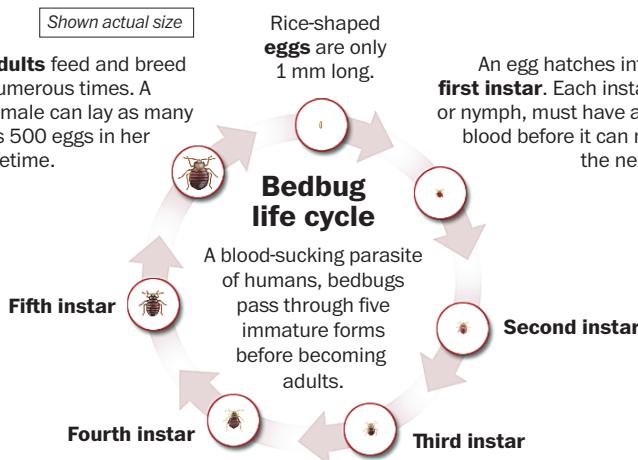
The technique may work well for single-family homes, but apartments and hotels are more of a challenge. Bedbugs use hollow walls and cracks in masonry as avenues to spread into other units.

In those instances, pest-control experts recommend tandem treatments. Diatomaceous earth, a natural powder, is blown into wall spaces, where it can cause any bedbug that comes in contact with it to eventually dry out and perish.

While bedbugs aren't known to transmit disease, they can "affect the mental health of people living in infested homes," according to a joint statement this year by the Centers for Disease Control and Prevention and the EPA. Reported effects "include anxiety, insomnia and skin problems that arise from profuse scratching."

#### Bug-avoidance tips for travelers

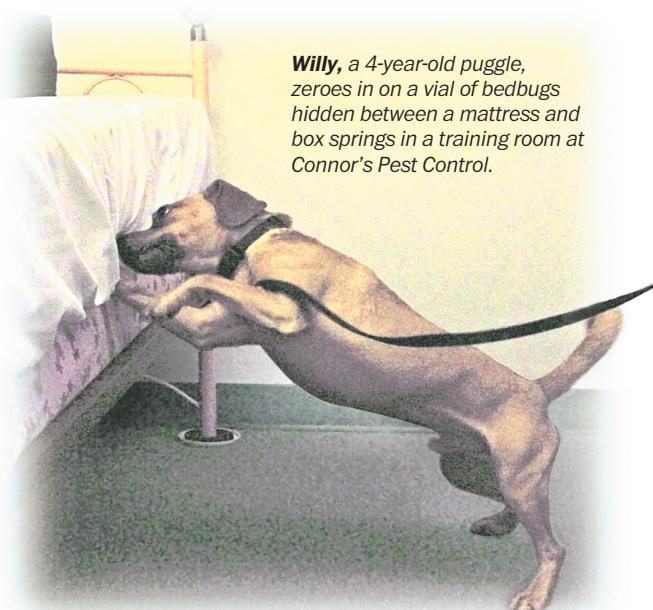
- Inspect your room before settling in. Turn back the bedding to look for dark fecal spots left by bedbugs in mattress seams and behind the headboard.
- If you see signs of an infestation, alert the management and ask to be moved to another room that isn't adjacent to the infestation.
- Store your suitcase on the luggage rack, off the floor and away from the bed. Keep your belongings in your suitcase.
- When returning home, leave luggage outside or in the garage. Remove clothing and wash and dry it in a hot dryer for 20 minutes.
- If luggage must be brought inside, seal it in a heavy plastic bag.



SOURCES: Proceedings of the Sixth International Conference on Urban Pests, Integrated Pest Management Practitioner, Medical and Veterinary Entomology, World Health Organization, Central Ohio Bed Bug Task Force, Journal of Economic Entomology, D.C. Department of Health

To learn more, go to [washingtonpost.com/urbanjungle](http://washingtonpost.com/urbanjungle).

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# To tell or not to tell about the bedbugs nearby

BY BENNY L. KASS

• Originally Published January 1, 2011

**I am trying to sell my condominium unit and have just learned that some of our units have bedbugs. Obviously, this is a real concern. Do I have to disclose this information to prospective buyers? I want to be honest, but I also want to sell and don't want to scare people away.**

Legally, you do not have to disclose that other units have these bugs. Unfortunately, even when sellers decide to provide full disclosure, the required disclosure forms only ask about wood-boring insects, not bedbugs.

But I ask a fundamental question: How would you feel if you were a buyer and learned — after settlement — that the complex was infested?

Accordingly, my advice is to make absolutely sure the property manager as well as the individual unit owners are addressing these issues. Once you have this assurance, you should advise your buyers that there is a problem in other units but that proper corrective treatment is under way.

I know that property managers and board presidents will claim that this is not a condominium association problem. That may be a valid position if only one unit is involved, but if there are multiple units with bedbugs, then I believe this is a problem that must be addressed by the association.

There are several reasons for this. First, the bugs come from outside and enter through common-element walls. Second, and perhaps more important, if the board does not take action, you may have different owners using different



ASSOCIATED PRESS

**Bedbugs present a dilemma to a condominium seller who knows of their presence in the complex but not his own unit.**

CONTINUED ON PAGE 17

## An Integrated Curriculum For The Washington Post Newspaper In Education Program

CONTINUED FROM PAGE 16

companies to resolve the problem. And if the bugs are forced to leave one unit, they will most likely invade the property next door.

I would also inquire whether the property manager has contacted those owners who have the problem. It is not easy to eradicate bedbugs, and professional pest-control companies should be hired. There are a number of self-help remedies that can be used in conjunction with professional treatment, such as filling in cracks in floors, walls and molding, using a powerful vacuum all around the unit, and even encasing mattresses in special bags designed to keep the bugs away.

Although these little critters have been around for a long time, after World War II they were largely eradicated with the use of a pesticide known as DDT. However, because it was so toxic, DDT was permanently banned from use in the United States in 1972.

As a result, bedbugs have returned, and in force. A New York City hotline says it received more than 11,000 complaints about bedbugs in 2009, compared with only 537 in 2004.

New York, which has been on the front line of the bedbug resurgence,

responded. Effective Aug. 31, residential property owners or their managing agents who rent apartments must give prospective tenants a notice indicating the property's bedbug infestation history during the preceding 12 months. Of course, it applies only to New York City.

Since you did not mention where you live, let's review disclosure requirements for resales in all three Washington area jurisdictions.

When an existing condominium owner wants to sell, prospective buyers must be provided with two different disclosure documents: a resale package from the association, and a seller's disclosure statement.

In general, Maryland, Virginia and the District all require that the association provide buyers with such information as the amount of reserves available, projected expenses for the current and next year, and a copy of the most recent budget. Potential buyers must also be given copies of current legal documents.

There are also requirements that the seller must disclose certain information about the unit itself. Each jurisdiction has forms that must be completed and provided to potential buyers before they sign a sales contract. In the District,

full disclosure is required, but you only have to report conditions about your individual unit. In Maryland and Virginia, sellers have the option of either disclosing or disclaiming. To disclaim means that the property is sold "as is" — with all defects that may exist — and the seller does not wish to make any disclosures.

If a buyer received the disclosure statement before entering into a sales contract, there is no right to cancel based solely on the information provided in the disclosure. The law presumes that a potential buyer read the disclosures and could either walk away or try to negotiate a lower price if not satisfied. However, if disclosure is received after a contract is entered into, Maryland buyers have five days in which to cancel the contract. In Virginia it is three days, and in D.C. buyers have five calendar days in which to cancel.

*blkass@kmklawyers.com*

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*Benny L. Kass is a Washington lawyer. This column is not legal advice and should not be acted upon without obtaining your own legal counsel. For a free copy of the booklet "A Guide to Settlement on Your New Home," send a self-addressed stamped envelope to Benny L. Kass, 1050 17th St. NW, Suite 1100, Washington, D.C. 20036.*

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# THE ENVIRONMENT

## *Bugs, beetles and borers put U.S. forests at risk*

BY BRIAN VASTAG

• Originally Published December 13, 2010

Call them America's most wanted critters: the emerald ash borer, the Asian long-horned beetle, the Asian gypsy moth. After arriving via wooden shipping pallets or crates, this insatiable trio has munched its way through millions of trees over the past 20 years, costing state, local and federal agencies tens of billions of dollars for eradication,

quarantine, and tree removal and replacement.

Emerald ash borers — named for their habit of drilling through bark — have crawled into 15 states and two Canadian provinces since surfacing near Detroit in 2002, arriving in Tennessee this summer. In response, the U.S. Department of Agriculture and state natural resources departments have rolled out campaigns urging the public to look out for the bug and to use only local sources of firewood. These high-profile offenders are among friends. From 1860 to 2006,

at least 455 tree-loving insect species arrived on American shores, as did 16 damaging tree diseases, say the authors of a report in the December issue of the journal *BioScience*. Despite regulations designed to stymie the six-legged hoard, two to three new invasive insect species set up shop in the United States each year.

"They act as silent invaders, and nobody knows that they're trickling in until the beautiful hundred-year-old

CONTINUED ON PAGE 19



MEL EVANS/ASSOCIATED PRESS

A gypsy moth caterpillar spotted in New Jersey in June. This year's infestation has been called one of the largest in recent years.

## An Integrated Curriculum For The Washington Post Newspaper In Education Program

CONTINUED FROM PAGE 18

tree in your front yard is killed," says report author Julieann Aukema, a forest ecologist with the National Center for Ecological Analysis and Synthesis (NCEAS) in Santa Barbara, Calif. "They're very difficult to detect and once they are detected, the population is already established and they're virtually impossible to eradicate."

While most invasive insects do minimal damage, 16 percent of the species Aukema analyzed feasted their way onto her "high impact" list by killing trees and racking up containment costs. A single invasive species can decimate forests as well as urban trees if it reproduces quickly, finds trees it relishes, and lacks natural predators.

The emerald ash borer — "easily the worst insect we have now, a killer," Aukema says — fits that profile. The glittering half-inch beetle likely arrived in North America at least a decade earlier than its 2002 sighting, says Manuel Colunga-Garcia, an entomologist at Michigan State University in East Lansing.

Last year, the NCEAS, which is funded by the National Science Foundation, predicted that the beetle will cost government agencies \$10 billion to \$20 billion over the next decade.

The borer arrived in Prince George's County in 2003 on "bad nursery plant stock" transported from Michigan, says

Steven Koehn, director of the Maryland Forest Service. Some of those plants were then moved to Fairfax County, sparking an infestation there.

After Maryland's initial eradication efforts appeared successful, the flying bug reappeared in the state in 2006, forcing a switch in tactics from eradication mode" to "slow-the-spread mode," Koehn says. State agents remove infected trees while leaving nearby healthy ash trees intact as "trap trees," to attract and collect more bugs. Both states monitor the range of the bug by widely deploying pheromone traps that attract the insects. Both states also advise residents not to move firewood and to contact their local agriculture extension office if they spot the shiny bug.

Likewise, the Asian long-horned beetle has caused consternation since its first appearance, in Brooklyn, in 1996. The beetle dines on maples, boxelders, and willows and has since been spotted in New Jersey, Massachusetts and near Chicago, in what was likely a second introduction via wooden shipping materials from Asia.

Aukema's analysis shows that while insect pests from earlier eras preferred to munch foliage, the latest wave of invaders tend to be wood borers that can silently lurk deep inside shipping containers.

The worldwide boom in container shipping presents an enormous hurdle to stopping invasive insects, says Frank Lowenstein of the Nature Conservancy, which funded the current study and is undertaking a broader economic analysis of tree pests. The Department of Homeland Security is tasked by the USDA to inspect imports for insects, but the huge influx of goods means "the entire U.S. military would not be able to stop the flow of these pests," Lowenstein

says. "Inspection is not likely to be the answer."

Since 2005, USDA regulations have required wooden shipping materials to be heat-treated or fumigated before arrival in the United States, and 98 percent of imported materials are certified by the originating country as meeting that standard, says Alyn Kiel, a spokeswoman for the USDA's Animal and Plant Health Inspection Service. And yet, the bugs keep flowing. Lowenstein said the Nature Conservancy has encouraged the USDA to study why the regulations aren't working. "It's unclear whether the standard ... doesn't kill enough bugs, or whether there are problems of implementing the standard, or whether intentional fraud is going on" in the country of origin, he says.

Imported live plants act as the second pest vector, Aukema and Lowenstein say. Some 2.5 billion decorative plants enter the country each year; a proposed USDA rule to strengthen plant importation standards has languished since its drafting in 2004. "The USDA has not successfully moved the rule forward," says Lowenstein. "There's no excuse for that."

Kiel says the agency is reviewing public comments on the proposed rule, which would make it easier for officials to restrict importation of high-risk plant species. She said that the agency has no timeline for finalizing the rule but that preventing the introduction of forest pests is a "high priority" for the USDA.

Aukema says that even if stricter import regulations are enacted, many "sleeper species" may already be on the continent, spreading slowly until "hitting the jackpot" by finding the perfect living conditions.

"We have to realize this is a byproduct of global trade," she says. "We don't want to get rid of that, but we do want to minimize the risk. There has to be a recognition of the seriousness of these pests."

— Special to The Washington Post



COURTESY MARYLAND DEPARTMENT OF AGRICULTURE

**The emerald ash borer is responsible for a high percentage of damage to North American forests.**

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# Invasion of stink bugs has homeowners, farmers seeking relief

BY LENA H. SUN

*Washington Post Staff Writer*

• Originally Published September 25, 2010

Shaped like shields and armed with an odor, dime-size brown bugs are crawling into area homes over windowsills, through door crevices and between attic vents in such numbers that homeowners talk about drowning them in jars of soapy water, suffocating them in plastic bags or even burning them with propane torches. In the process, some people are unwittingly creating another problem: When squashed or irritated, the bugs release the distinctive smell of sweaty feet.

Get used to it, experts say — the invasion is only going to get worse.

"This is the vanguard," said Mike Raupp, a University of Maryland entomologist and extension specialist. "I think this is going to be biblical this year," he said. "You're going to hear a collective wail in the Washington area, up through Frederick and Allegany counties, like you've never heard before. The [bug] populations are just through the ceiling."

The change in season, as days shorten and nighttime temperatures start to dip, is nature's call to the brown marmorated stink bug — pest extraordinaire — to leave its summer gorging grounds and seek refuge inside. What's happening now is a massive population shift from orchards, cornfields and gardens to suburban homes, office buildings and hotels - the urban U.S. equivalents of rocky outcroppings in the stink bug's native Asia.

Stink bugs are harmless to people and their possessions. They don't bite. They don't sting. They're not known to transmit disease. But their population has grown so tremendously that they are not only causing vexation to homeowners but also, for the first time, wreaking damage to peaches and apples, soybeans and corn, and even ornamental shrubs and trees.

There is no easy way to kill lots of the bugs at once. They have no natural predators in the United States. Pesticides don't work effectively. The insects travel easily — hitching rides on buses and construction material — and adapt to winter in homes. As a result, they have flourished, spreading to 29 states since they arrived in Allentown, Pa., in 2001, likely stowaways in a shipping container from Asia. They are native to Japan, Korea and China, where they are known as "stinky big sisters."

And now they are causing a stink in the mid-Atlantic region.

Experts say homeowners should prevent them from coming indoors by sealing cracks and openings around doors and windows. Once the bugs are inside, residents can vacuum them up, remove the bag and put it in the garbage outside. (Beware: The smell may linger in the vacuum cleaner.) Experts warn against using outdoor pesticides.

## It's true: 'They smell'

"I'm looking out my window here, and I bet I have 30 of them on the screen," said longtime Middleburg resident Margo Tate. "My husband smushes them and throws them in the trash. They're a mess. They smell when you squish them."

Lori Rice, 48, runs an organic farm

in Middleton, in Frederick County. She finds them indoors and outside. Indoor bugs she traps in "death jars" — pint jars containing soapy water. The soap, she said, dissolves the exoskeleton. Twice a day, she flushes the bugs down the toilet.

On Rice's farm, Asian pears, raspberries and tomatoes have all suffered.

"If all our vegetables hadn't already [been] withered by the heat and drought this year, the bugs would likely have broken our hearts there as well," she wrote in an e-mail.

She is experimenting with spraying soapy water outside.

For people, stink bugs are nowhere near the menace of bedbugs, which feed on human blood. Their resurgence prompted the U.S. Centers for Disease Control and Prevention to issue an unusual statement last month about their public health impact.

Stink bugs, by contrast, are a mere nuisance for people, though they are causing farmers real distress.

Maryland's Agriculture Department last week warned that the bug is emerging as a devastating pest to orchard owners and potentially to soybean growers.

"In Maryland this year we have had the most extensive brown marmorated stink bug damage to both tree fruit and vegetables ever reported in the U.S.," said Jerry Brust, a University of Maryland pest expert.

Bob Black, whose 100-acre Catoctin Mountain Orchard in Thurmont, Md., includes peaches and apples, said he has lost about 20 percent of his crop. The bugs

CONTINUED ON PAGE 21

## An Integrated Curriculum For The Washington Post Newspaper In Education Program

CONTINUED FROM PAGE 20

suck out juices, leaving pockmarks that make fruit and vegetables unmarketable.

Dairy farmers are worried that cows that feed on chopped-up field corn full of dead stink bugs might develop a bad smell in their milk.

#### Federal intervention?

Rep. Roscoe Bartlett, a Republican who represents Maryland's rural 6th District, sent a letter Friday, signed by 15 members of Congress, asking U.S. Agriculture Secretary Tom Vilsack and Environmental Protection Agency Administrator Lisa P. Jackson to take immediate action to limit damage caused by *Halyomorpha halys*.

Because so little is known about the insect, researchers at the U.S. Department of Agriculture and state universities in Maryland, Pennsylvania, Delaware, Virginia and New Hampshire (the bug popped up there for the first time this year) have formed the Brown Marmorated Stink Bug Working Group. Among the priorities: study the bug's basic behavior and biology, identify



natural ways to control it and develop public awareness.

Tracy Leskey, a USDA scientist and a leader of the group, made the first positive identification of a specimen in Maryland in 2003, at a gas station in Hagerstown. She tracks them from her research station in Kearneysville, W.Va. Outside Shepherdstown, where she lives, residents have reported having thousands massing on the sides of their homes. "I have never seen anything like this in my career," said Leskey, 42.

Researchers are racing against the clock to find ways to kill the stink bugs.

At a USDA lab in Newark, Del., scientists have quarantined tiny parasitic wasps — collected from China and Korea, where they are the bugs' natural predators — to determine whether the wasps can be used against the stink bugs without harming other species here. The wasps attack the eggs of the stink bugs. That research is likely to take two more years.

A more immediate solution may be ready for trapping them. At another USDA lab, in Beltsville, entomologist Jeff Aldrich and his colleagues found that stink bugs can be lured into traps with a chemical. The pheromone is released by a different species of stink bug native to Japan, a cousin of the dreaded bug now here.

One company is developing a trap, expected to be ready by next spring, that uses the pheromone as a lure.

Traps might be useful for homeowners but aren't likely to be effective in the orchards. For outdoors, Aldrich is working with another company to incorporate the compound in an existing attract-and-kill technology called Splat. It may be ready by next spring.

"It's some sort of goo, and the beauty is that you can mix in the pheromones and add in the insecticide and use regular farm equipment to spray it," Aldrich said.

In the meantime, homeowners are resorting to other methods. Silver Spring resident Parke Brewer used a plastic newspaper bag to trap 212 bugs one week this summer. Another Silver Spring resident, Muriel Cooper, said someone on her Stonegate neighborhood e-mail group list wrote of using a propane torch, damaging a screen door in the process.

Not everyone finds the bugs disgusting.

Lindsey Spindle's 2-year-old son is fascinated by them. They find three or four stink bugs in their Bethesda home a day. They are slow-moving and easy to catch. She uses them to explain how seasons change. ■

An Integrated Curriculum For The Washington Post Newspaper In Education Program

# That antsy feeling

BY ERIC NIILER

*Special to The Washington Post*

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The ants are coming. Actually they're already here, marching across kitchens, basements and bedrooms in record numbers this summer. The Washington area's wet spring and summer heat have led to a bumper crop of the tiny crawlers, looking for food wherever they can find it. And experts say they will probably be with us for the next month or two.

"This has been a spectacular year for ants," said Mike Raupp, a professor of entomology at the University of Maryland, who has had to fend off his own ant infestation. "I've gotten more calls than any time in the past 10 years."

That will come as no surprise to David Yost of Centreville, who started seeing ants in May, including a few strays that made their way into his kitchen. So before leaving for a 12-day vacation in June, he cleaned up all the crumbs in his pantry and laid down some ant powder along the front door entryway, where an advance guard of ants had come into the townhome. When he got back from his trip, a trail of black

CONTINUED ON PAGE 23

IMAGES FROM CORBIS; WASHINGTON POST PHOTO ILLUSTRATION

## An Integrated Curriculum For The Washington Post Newspaper In Education Program

CONTINUED FROM PAGE 22

|marauders awaited him.

"The ants pushed their way through the [powder], made their way down the hall into the kitchen and into the upper shelf of the pantry, and proceeded to take over my house," Yost said. "There were thousands carrying off my cereal. That is when I got serious."

To fight back, Yost sealed every crack that he could find with silicone caulk. He has tossed out all of his cereal and keeps all of his food in the refrigerator. For the past week, he has been ant-free.

"I want to declare victory," Yost said. "But somehow I feel we may not be done with this yet."

#### Plenty of aphids, too

That's probably the right attitude, given that ants have been around for at least 110 million years and are native to pretty much every continent except Antarctica. There are nearly 12,000 ant species, and although they are a nuisance, they don't carry disease, they help keep away other pests and they are important scavengers, carting away dead insects and scarfing up scraps of food.

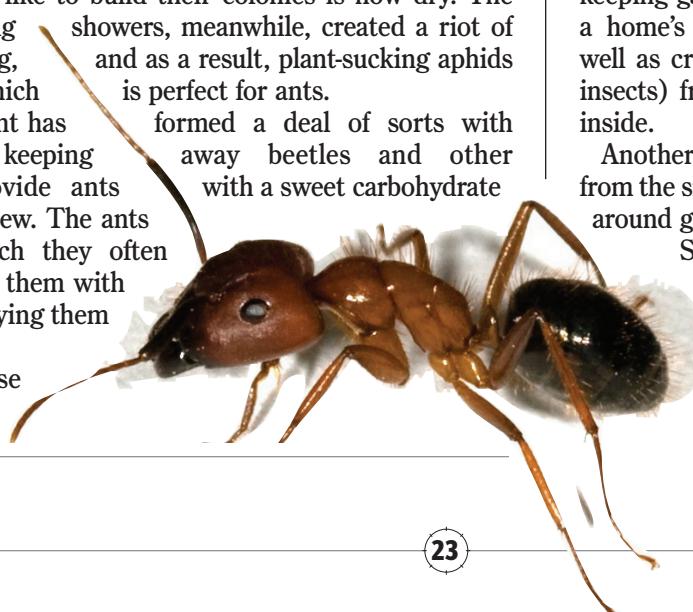
There are a few common types that area residents encounter, including carpenter ants (*Camponotus pennsylvanicus*), whose taste for wood can destroy porches, fences and even roofs, and the Allegheny mount builder (*Formica exsectoides*), which erects three-foot-high colonies and kills nearby trees with bites of formic acid.

But the main ant driving people crazy is the odorous house ant (*Tapinoma sessile*). These are the sugar-loving kitchen crawlers that form foraging trails in search of food. Tenacious but tiny (only a sixteenth of an inch), they build backyard colonies of about 100,000 individuals that frequently move. Squish one and you'll smell the odor of burnt coconut. They don't bite.

Raupp and other insect experts say the odorous house ant has proved so successful this year because of ideal environmental and ecological conditions. Raupp says lack of much rain lately means that the ground where ants like to build their colonies is now dry. The winter snows and spring showers, meanwhile, created a riot of plant growth this spring, and as a result, plant-sucking aphids are super-abundant, which is perfect for ants.

The odorous house ant has aphids. In exchange for keeping predators, aphids provide ants secretion called honeydew. The ants like honeydew so much they often "tend" aphids, stroking them with their antennae and carrying them around.

Each odorous house ant colony sends out



## How to get rid of ants: Bait, poison powder, spraying and more

Ants are tenacious insects, so to get rid of them it's important to be just as persistent. A variety of methods can be used to deal with tiny odorous house ants, but none works overnight. The key, according to experts, is to disrupt the ants' foraging trails, which lead from the outdoor colonies to your kitchen. A little reconnaissance around your home and garden may be a good first step.

Also, keep the kitchen spotless. Scouting ants are looking for drops of fruit juice, sugar, sweetened cereal or anything else they can take back to the colony. Once a trail is established, it takes a while to get rid of it.

Liquid or gel ant baits sold at many hardware stores work by mixing something sweet with a delayed-action poison, boric acid. The idea is to apply several drops of this bait where the ants enter your home. The ants carry the bait back to the colony, feed it to the developing larvae or queen, which then perish. The ants will figure out quickly that it's not a good place for food and will look somewhere else.

Other products come in a granular or powder form, which can be sprinkled across the ant trail, forming a perimeter of sorts around the entry points. The poison powder is picked up by the ants and taken back to the colony, where it starts to kill.

Entomologist Mike Raupp also recommends keeping garden mulch at least 18 inches away from a home's foundation. That will prevent ants (as well as crickets, termites, spiders and other small insects) from using the mulch as a conduit to get inside.

Another tip: Trim bushes, shrubs and tree limbs from the sides of your house. Ants use them to climb around ground-level obstacles to get indoors.

Some pest-control companies recommend spraying for ants, but it may take several applications and cost hundreds of dollars. Not to mention the pesticide residue in your home. ■

— Eric Niiler

CONTINUED ON PAGE 24

## An Integrated Curriculum For The Washington Post Newspaper In Education Program

CONTINUED FROM PAGE 23

scouts in search of honeydew from aphids and other scale insects. It's this hunt that leads them to explore your kitchen, Raupp said.

"If they find a molasses jar or honey, fruit juice, pancake syrup, whatever, they will high-tail back to the colony, leaving behind a pheromone trail, which will be used by other workers right back to the sugar source," Raupp said. "Then it becomes a steady colony of raiders finding entry points, and the raid is underway."

### Defensive measures

David Ziegele of Chevy Chase knows about these raids.

"We've been extremely diligent in the kitchen," said Ziegele, a management consultant and retired EPA official. "But some mornings we would see hundreds crawling in a line looking for anything."

Ziegele has lived in his home for more than 25 years, but this is the first time he can remember so many ants making their way inside. He sprinkled chili powder along the windowsill. (He had heard that ants don't like hot stuff.) Nada.

Then he put out some drops of liquid ant killer: "It slowed them down for a while, and then they came back."

The key to getting rid of the odorous house ant is finding their foraging trails and then trying to block or redirect them back outside, Raupp says. That can be done with a variety of ant baits or borax powder, and it may take several tries. He says it's also important to keep the kitchen spotless. The slightest drop of sugary juice from fruit or anything else could trigger an ant attack.

For those who have been battling the pesky invaders this summer, Eric Day, a Virginia Tech entomologist, offers some late-summer hope. He expects the numbers to decline in late summer as the ants' main outdoor food source diminishes.

"We're seeing peak numbers, and they will stay high through July," Day said. But "as their food source dries up [as plants die off], the ant colonies will dry up."

For all their ickiness, ants keep homes and back yards clean, Day said.

"They are very important scavengers, feeding on dead insects and other protein sources. Anytime you have a scavenger, it plays a hidden role," he said. "People don't like to think about ants and flies and beetles that are feeding on decaying organic matter, but they keep the environment from cluttering from all this debris." ■

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Niiler is a Washington-based science writer and radio producer. He can be reached at <http://www.ericniiler.com>.

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## Academic Content Standards

*This lesson addresses academic content standards of Maryland, Virginia and the District of Columbia.*

### Maryland

**Science, Environmental Science:**

Recognize and explain how human activities can accelerate or magnify many naturally occurring changes.  
b. Identify and describe how human activities produce changes in natural processes:

- Climate change
- Loss of habitat due to construction
- Hunting and fishing
- Introduction of nonnative species
- Cycling of matter (Standard 6, Topic B, Grade 8)

**Science, Skills and Processes:** Recognize that clear communication is an essential part of doing science because it enables scientists to inform others about their work, expose their ideas to criticism by other scientists, and stay informed about scientific discoveries around the world. (Standard 1, Topic C, Grade 5)

**Reading, General Reading Processes:** Students will use a variety of strategies and opportunities to understand word meaning and to increase vocabulary.

- a. Acquire new vocabulary through listening to, independently reading, and discussing a variety of literary and informational texts (Standard 1, Topic D, Grade 5)

The Maryland Voluntary State Curriculum Content Standards can be found online at <http://mdk12.org/assessments/vsc/index.html>.

### Virginia

**Biology:** The student will investigate and understand bases for modern classification systems. Key concepts include

- a) Structural similarities in organisms
- b) Comparison of developmental stages of organisms
- c) Examination of local flora and fauna (BIO 7)

**Biology:** The student will investigate and understand dynamic equilibria within populations, communities, and ecosystems. Key concepts include:

- a) Interactions within and among populations including carrying capacity, limiting factors and growth curves
- b) The effect of natural events and human influences on ecosystems
- c) Analysis of local ecosystems (BIO 9)

**Life Science:** The student will investigate and understand that interactions exist among members of a population. Key concepts include

- a) competition, cooperation, social hierarchy, territorial imperative; and
- b) influence of behavior on a population. (LS.8)

**Economics and Personal Finance:** The student will demonstrate knowledge of the role of producers and consumers in a market economy by:

- e) describing how costs and revenues affect profit and supply (EPF.2)

Standards of Learning currently in effect for Virginia Public Schools can be found online at [www.doe.virginia.gov/testing/sol/standards\\_docs/index.shtml](http://www.doe.virginia.gov/testing/sol/standards_docs/index.shtml)

### Washington, D.C.

**Biology, Ecosystems:** Students should understand Ecosystems as dynamic systems. Specifically students should be able to:

Explore and explain how changes in population size have an impact on the ecological balance of a community and how to analyze the effects (Strand 4, Standard 17, B.17.3)

Describe how the physical or chemical environment may influence the rate, extent, and nature of the way organisms develop within ecosystems. (B.17.4)

**Visual Arts:** Apply artistic processes and skills in a variety of media to communicate meaning and intent in original works of art:

Use contemporary technologies to create original works (e.g., film, photography, computer graphics, or video), (Production and Creative Expression, Strand 2, Grade 7, 7.2.11)

Design a work of public art appropriate to and reflecting a location (e.g., a Metro station), (Production and Creative Expression, Strand 2, Grade 8, 8.2.7)

Assemble and display objects or works of art as a part of a public exhibition (High School Proficient, Strand 2, HSP.2.8)

Learning Standards for DCPS are found online at <http://dcps.dc.gov/DCPS/In+the+Classroom/>