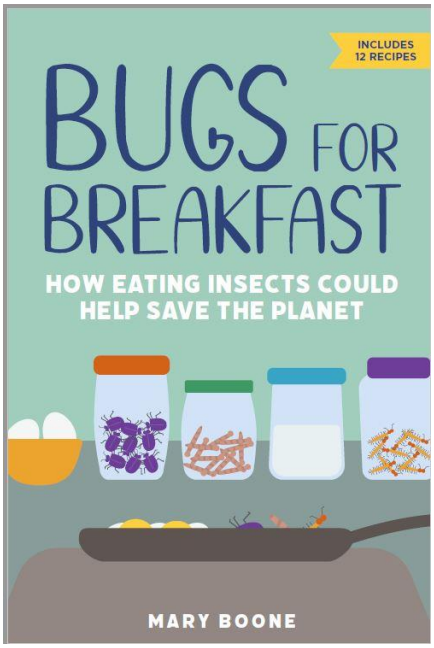
A Teacher's Guide

BUGS FOR BREAKFAST

About the book



Most North Americans would rather squish a bug than eat it. But roasted grubs are a favorite in Australia, the Batswana eat live termites, and stir-fried dragonflies are a delicacy in Indonesia. More than one-fourth of the world's population eats insects—a practice called entomophagy.

Bugs for Breakfast: How Eating Insects Could Help Save the Planet helps middle-grade readers understand the role insects fill in feeding people around the world. Readers are introduced to the insect specialties and traditions of various countries. They discover how nutritious bugs can be and they learn why dining on insects is more environmentally friendly than eating traditional protein sources. Readers will see how making small changes in their own diets could help ensure no one goes hungry.

Bugs for Breakfast may not completely remove the yuck-factor from the notion of eating bugs, but it helps open young readers' minds to what is happening in the world around them.

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Reading age: 9 - 12 years
Grade level: 4 - 7

This guide is intended to support classroom instruction. Let this guide serve as a foundation from which you build and adapt activities and discussions. Materials included within this packet may be reproduced and shared.

Common Core State Anchor Standards Alignment for BUGS FOR BREAKFAST:

- English Language Arts Anchor Standards for Reading: CCSS.ELA-LITERACY.CCRA.R.1, R.2, R.3, R.4, R.7, R.10
- English Language Arts Anchor Standards for Writing: CCSS.ELA-LITERACY.CCRA.W.1, W.2, W.4, W.5,
- English Language Arts Anchor Standards for Speaking & Listening: CCSS.ELA-LITERACY.CCRA.SL.1, SL.2, SL.4, SL.5,SL. 6
- CCSS Anchor Standards for Mathematics: CCSS.MATH.PRACTICE.MP1, MP2

Next Generation Science Standards:

- K.Interdependent Relationships in Ecosystems: Animals, Plants, and Their Environment: K.LS1.1, K.ESS2.2, K-ESS3-1, ESS3-A, ETS1.B

About the author

Mary Boone has ridden an elephant, jumped out of an airplane, hung out backstage with a boy band, and baked dozens of cricket cookies – all in the interest of research for her books and magazine articles. She has written more than 60 nonfiction books for young readers, ranging from inventor biographies to how-to craft guides.

Mary grew up in rural Iowa. Prior to writing books, she reported and edited for several daily newspapers.

She now lives in Tacoma, Washington, with her husband, Mitch, and children, Eve and Eli. Mary loves being outdoors and hanging out with her energetic Airedale Terrier, Ruthie Bader.

Some of Mary's other recent books include:

Transportation Inspired By Nature, Capstone Press, 2019
Buildings Inspired By Nature, Capstone Press, 2019
Let's Look at Germany, Capstone Press, 2019
Let's Look at Colombia, Capstone Press, 2019
Let's Look at Ecuador, Capstone Press, 2019
Hydropower: Energy Revolution, Capstone Press, 2019
I Can Care for Nature, Capstone Press, 2019
I Can Reuse and Recycle, Capstone Press, 2019
Ada Lovelace, Capstone Press, 2018
Mae Jemison, Capstone Press, 2018
Johannes Gutenberg: Inventor and Craftsman, Capstone Press, 2018
Thomas Edison: Physicist and Inventor, Capstone Press, 2018
George Washington Carver: Botanist and Inventor, Capstone Press, 2018
Hair Hacks: Your Tresses Troubles Solved! Capstone Press, 2017
Nail, Hand, and Feet Hacks: Your Nail Nuisances Solved! Capstone Press, 2017
Behind-The-Scenes Music Careers, Capstone Press, 2017
Busting Boredom with Art Projects, Capstone Press, 2017

Reading Nonfiction

Ask students to read one chapter – any chapter – of *Bugs for Breakfast*. You may opt for solo reading or teacher read aloud. As students read or listen, they should take notes. This can be set up a class activity, or you may want to divide students into smaller groups so they can share their findings with each other. Ask students to answer these questions:

1. Write down a word from the text that you do not know. Are you able to use clues from the text to determine what the word means?
2. After reading the chapter, identify the main idea.
    a. Make a poster that includes the book title, chapter number, and main idea. Be as artistic as you want.
    b. Display posters in the classroom and allow time for other students to ask and answer questions.
3. Write two to three sentences summarizing the chapter.
4. In this chapter, what facts stand out? What questions do you still have?
5. Which of the five major nonfiction text structures has the author used in this chapter? (Descriptive, sequence, compare and contrast, cause and effect, problem and solution) Did you find more than one?
6. How do you think the author feels about the subject? Provide evidence from the chapter to support your answer.
7. How do the author's feelings influence the text?

Questions for Writing and Discussion

1. What is entomophagy?

2. Why do scientists and environmentalists think more people should be eating insects?

3. What has been done to try to change attitudes in the North America and Europe?

4. The United States Food & Drug Administration allows a certain number of insect parts and eggs in food. What is the difference between eating peanut butter containing insect fragments or candy coated with animal secretions and eating a protein bar that's labeled to tell you it's made with cricket powder?

5. What do you think is keeping insects from being more widely consumed in Western cultures?

Persuasion

Divide students into groups of three to six. All groups receive the same instructions:

> **Your school is going to begin serving insects for lunch. Your group is a marketing firm hired to convince students this is a good idea. Create an advertisement that sells students on the idea.**

Keep these things in mind:

- Who is your audience?
- What kind of advertisement is most likely to appeal to them? Posters in the hallway? Newspaper ad? Commercial on TV or Spotify? Paid social media post by an influencer? Hiring a well-known scientist to appear in ads?
- What does your audience care most about? Sustainability? Taste? Nutrition? Supporting local farmers? Being part of a new trend? The stigma that goes along with eating insects?
- What strategies will you use to try to change attitudes?
- How will your group suggest packaging or presenting the insect-based food so it is appetizing to students?

Give groups time to work through their plans. They're going to need to use their skills of persuasion. Use persuasive words. Support opinions with facts and details. Allow groups to present their advertisements to the class.

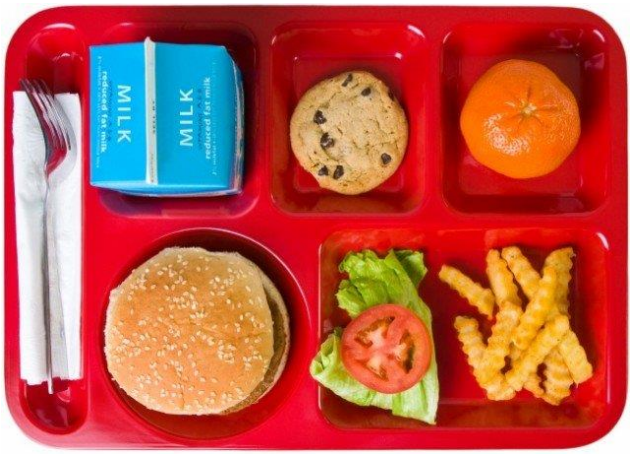
Presentation of Knowledge and Ideas

Individually or in groups of two to three, students should research an insect-based recipe from another part of the world. The research will be used to create presentations to be shared with the class. Emphasize the need to use reliable and credible sources.

Encourage students to think creatively. Perhaps they'll want to be a newscaster sharing information. They could pretend to be a Food Network star preparing a recipe. They might write and share a blog post. Presenters may want to include some or all of this information:

- What is this dish called?
- What insect or insects does it feature?
- How is it prepared?
- In what region or regions of the world is it eaten?
- Is the recipe eaten during a certain of the year? Is it a casual or fancy meal?
- What nutritional value do these insects have? Are these insects raised on farms or are they caught in the wild?
- Have you ever eaten a similar dish made with tradition protein, like beef or chicken? What was that dish called?

How Much Water Is On Your Plate?



This activity will help students explore how much water is required to produce the foods they eat.

Begin by gathering students and asking them about their favorite school lunches. You may want to have them vote for favorite fruit/vegetable, entrée, dessert, and drink. Write the "winning" lunch menu on the water board.

Using this online resource, calculate how much water is required to prepare one of these lunches. (There is an alphabetical directory which makes navigating a bit simpler.)

You're going to have to do some math along the way. For instance, if pasta is on your menu, you'll find it takes 222 gallons of water to produce a pound of dry pasta. A single serving of pasta is typically about 2 ounces. There are 16 ounces in a pound, so you need to divide 222 by 8 to find that it takes 27.75 gallons of water to produce one serving of pasta. You may need to do some estimating and guessing along the way. Not every food is included on this calculator. Your main goal is to come up with an estimate of how much water was required to produce this specific school lunch.

Now, it's challenge time: Working as individuals or in small groups, come up with a delicious-sounding lunch menu that includes a fruit or vegetable, entrée, dessert, and beverage with a smaller water footprint. Have students share and compare their menus.

- Which new menu requires the least amount of water?
- How many fewer gallons of water does it take to produce this new lunch?
- Multiply those saved gallons by the number of students who typically eat school lunch. How much water could your school save if they served this new lunch instead of the first lunch you calculated?

Calculate Your Water Footprint

Read this brief introduction to your class:

> **We all need clean, fresh water to live. But as the world's population grows, so does the demand for water. In addition to drinking water, we use water to take showers, brush our teeth, flush the toilet, and water the lawn. We also use it to grow and produce food, make energy, and manufacture everything from cars to clothing. Each person has a water footprint. A water footprint is the amount of water used by an individual directly, and indirectly to produce goods and services.**

Make certain students understand the difference between direct and indirect or virtual use. It's often easiest to think about direct water use being water we actually touch or see: drinking water, bath water, water in the toilet. Indirect water is everything else: water used for manufacturing, water used to grow the food we eat, water used to make paper or cars or jeans.

Now ask students to think about their own water footprints. Ask each studdirect ent write down how many gallons of water they think they use – directly and indirectly – in a typical day. It may be helpful to bring in an empty gallon jug as a visual.

Once everyone has made their guesses, send students online to better calculate their true water footprints. Some of these questions may require adult input. This can be a family assignment, or you may want to work through a sample calculation before having students run the program themselves. Click here to access the calculator.

Reconvene once students have calculated their actual water footprints. These questions may help guide the discussion:

- Is your actual water footprint larger or smaller than you guessed it would be?
- The average U.S. usage is 1,802 gallons per person. Is your footprint larger or smaller?
- What seemed to have the largest impact on your water footprint?
- What are some direct ways you could cut down on water usage?
- What are some indirect or virtual ways you could cut down on water usage?
- Are there ways your class or school could reduce its water footprint?
- Do you think reducing your water footprint should be a priority? Why or why not?

Snack Challenge

Everybody loves a snack. This activity will allow students to sample ways in which insect protein is being incorporated into different foods. It will also get them thinking about the ways in which insects could be incorporated into foods they're already eating.

The teacher will need to obtain the following:

1 package prepared soft chocolate chip cookies (Keebler or Entenmann are good choices)

1 package nacho cheese-flavored chips (a lesser-known brand like Toms or Wise is best)

1 package chocolate chip cookies made with cricket protein

1 package siracha or cheese-flavored chips made with cricket protein

Using colored cupcake wrappers, divide cookies and chips into sample-size portions. Use the colors to divide the cricket protein snacks from the non-cricket snacks. If different color sample containers are not available, simply write an A on the bottom of cricket-infused snacks, and a B on the bottom of those not containing crickets.

***Students with shellfish allergies should not taste the samples and should take care handing the samples. Insects have exoskeletons – just like shellfish. If you have an allergy to shellfish, you may also be allergic to insects. Exercise caution. ***

Give each student a copy of the Snack Challenge Observation sheet included in this Teacher's Guide.

Beginning with the chips, ask students to record their findings regarding the chips' appearance, texture, smell, and finally taste. They should complete observations about one sample before trying the second. Repeat this process with the cookie samples.

Gather students to ask which samples they think contained crickets and which did not. How did they reach their conclusions? Did they rely on visual and olfactory inspection as well as taste and texture?

Reveal to students which snacks were which. Are they surprised by the results? Which of the cricket products did they like best? Did any students prefer a cricket-based product to a non-cricket product?

Brainstorming time: Crickets can be ground into a fine powder and incorporated into many types of recipes. What other products could insect powder be added to? Have students think about the foods they eat. Have each student draw a picture or write a recipe showing how they'd add insects to a favorite food. Kraft Mac & Crickets anyone?

Snack Challenge Observations

	Chip A	Chip B	Cookie A	Cookie B
Appearance				
Smell				
Taste				
Texture				
Additional Notes				

Bugs for Breakfast Word Search

R O A S T E D E N L A C N Y

R O I P N A G E V O T N E O

Y E U O I A C R I C K E T R

E S T S T B T T C Y E N O H

Y X E A E E N A H B E N N A

P T O N W E T E I H P M Y N

R E C S I T Y H T L A E H T

O R T E K L E H I Y P A E E

T E E N S E U L N B U G F N

E B V T L N L P B I D E R N

I I P A T N I E A I E E A A

N F A R M I N G T H D L S E

P I I H U N G E R O C E S Y

A I B O H P O M O T N E P C

Locate these entomophagy-related words in the grid:

Healthy
Chitin
Chapulines
Entomophobia
Water
Bug
Roasted
Cricket
Entovegan
Hunger
Antennae
Protein
Lac
Insect
Honey
Frass
Fiber
Nymph
Farming
Exoskeleton
Edible
Beetle