



# beetles

Science and Teaching for Field Instructors

## Student Activity Guide

# You Are What You Eat

In this Matter and Energy Name Game, students learn each other's names through a chant about energy and matter, then each dance in the spotlight when it's their turn. It gives students a fun introduction to some words relating to matter and energy that the instructor can refer back to during later learning experiences. It also provides an opportunity for each student to feel "seen" at the beginning of a field experience.

### Students will...

- Learn each other's names.
- Have a moment in the "spotlight."
- Become familiar with the terms "matter" and "energy."

#### Grade Level:

Grades 3-8. Adaptable for younger or older students.



#### Timing:

30-50 minutes

#### Related Activities:

*Food Build Do Waste  
Decomposition Mission  
Case of the Disappearing Log  
Matter & Energy Diagram*



#### Materials:

Poster of the chant lyrics large enough to read. It works well to write them with a thick permanent marker on a manila folder, which can be folded to store in a pack.

#### Tips:

To ensure a successful experience, review the teaching tips found on page 2 and throughout this guide.



#### Setting:

Any setting large enough for the group to stand a circle.

## NEXT GENERATION SCIENCE STANDARDS

You Are What You Eat isn't a three-dimensional learning experience. It's a quick game to learn names, and to give each student a moment to express themselves, while lightly introducing students to some of the ideas and vocabulary that connect to the concepts of ecosystems, matter, and energy. This activity could be part of a 3-dimensional NGSS learning experience if combined with other activities focused on matter and energy. For more information on the NGSS standards related to matter and energy and connecting this activity to NGSS, see the BEETLES *Ecosystems, Matter and Energy Theme Hike*.



THE LAWRENCE  
HALL OF SCIENCE  
UNIVERSITY OF CALIFORNIA, BERKELEY

# You Are What You Eat

## ACTIVITY OVERVIEW

You Are What You Eat	Learning Cycle Stages	Estimated Time
Name Game	Invitation	5 minutes
Wrap-up	Invitation    Concept Invention	3 minutes
<b>TOTAL</b>		<b>~8 minutes</b>

**Field Card.** On page 8 of this guide is a pocket-sized version of this lesson that you can use in the field.

### TEACHING TIPS

**Helping students feel included.** Giving each student a moment in the spotlight helps them feel “seen” and included in the group. This can help prevent negative attention-getting behaviors, or withdrawal from students who might otherwise feel insecure or excluded.

**This is just a small introduction.** Don’t overestimate how much students learn from a chant such as this. Chants can give students practice saying and identifying key terms, but to achieve any kind of meaningful understanding of topics as complex as matter and energy, students need to have learning experiences that involve experiencing, thinking about, discussing, and applying these ideas in context. Use BEETLES activities such as *Food Build Do Waste*, *Decomposition Mission* or *The Case of the Disappearing Log* to engage students in learning about the movement of matter and energy in ecosystems. For more information on these activities, and how to put together a cohesive Ecosystems or Matter and Energy Theme field experience, see the BEETLES theme hikes.

## Name Game

1. **Take care of logistics for field experience first.** Make sure your students have the food, water, and other equipment they need, and that they've taken care of any bathroom business to be ready for the field experience.

2. **Gather students in a toe-to-toe circle.**

3. **Place paper with the following lyrics in the middle of the group:**

Your name is \_\_\_\_\_. You are what you eat.

Got matter, to make it. Energy to shake it.

Shake it \_\_\_\_\_! Shake it \_\_\_\_\_! Shake it \_\_\_\_\_!

4. **Tell students they're going to do a name game in which they'll each have a chance to do a little dance.** Explain that while the group is clapping a beat and doing a chant, they'll each have a turn to do a dance move of their choice, when the chant says, "shake it \_\_\_\_\_, shake it \_\_\_\_\_, shake it \_\_\_\_\_."

5. **Reassure them that it doesn't need to be anything fancy - just move your body.**

6. **Start clapping a moderate beat, choose a student to go first, tell them to say their name, & start the chanting.** Choose a student who seems like they would be comfortable being in the spotlight to go first.

7. **Lead the chant & encouragement as first student dances during "shake it\_\_\_\_\_."** Lead them in the chant, inserting the name of the first student into the chant, and reminding them to dance during the "shake it" part. Eg: "shake it Miguel!" Provide and encourage on-going support to each student, by cheering, whooping etc.

8. **Do the same for the rest of the participants, including yourself & other adults.**

## Wrap-up

1. **Explain the connection to the theme of Ecosystems, Matter & Energy.**

Tell students that as a group, you'll be spending your time thinking and learning about matter and energy as you explore the ecosystem.

2. **Explain: Organisms get matter from food to "make," & energy to "shake" their bodies.** Organisms get matter from food they eat to build their bodies ("Got matter to make it"), and energy from food to do things ("energy to shake it"). Note: Steps 2-3 can be done later, such as after *Mind Pie*. See note in margin.

3. **Explain: We'll be looking at how energy flows & matter cycles through the ecosystem.** During the field experience, when we check out an organism, we'll think about where it gets its food, and what body parts it uses matter to build, as well as what it uses energy from food to do. We'll also be thinking about how energy flows and matter cycles through the air, soil, and living things.

### TEACHING NOTES

**Including adults.** Adult or high school chaperones can add a lot to a field experience if they're engaged in the activities in a positive way. But sometimes they may "check out" of the experience, and have a neutral or negative effect on the group. Get them involved in the group right away by including them in this activity.

**Explaining matter "make it," & energy, "shake it" later.** If you're doing *Mind Pie* after this, then it's probably best to wait till after *Mind Pie* to do steps 2-3, in which you briefly explain how the "make it" part of the chant refers to organisms building their bodies using matter from food, and how the "shake it" part refers to using energy from food to do things.

### TEACHING NOTES

- 4. Move on to your next activity.** Suggested activity to immediately follow this are *Mind Pie* and/or *Walk & Talk*, using prompts related to matter, energy and ecosystems (which are included in their write-ups).
- 5. Move on to the rest of your field experience.** Go out and explore nature while using the lens of matter and energy to look at and think about organisms, air, soil, etc.
- 6. Do other activities related to Ecosystems, Matter, and Energy.** Use activities, such as BEETLES activities: *Decomposition Mission*, *Case of the Disappearing Log*, *Food Build Do Waste*, & *Matter & Energy Diagram*. Pay attention to what your students seem to understand, and what they don't, and choose activities that you think will support and push their level of understanding.

## Instructor Support

### Teaching Knowledge

**Allowing students to be “seen” at the beginning of an experience.** People like to feel “seen,” especially in a new group where they may feel socially uncomfortable. Without opportunities to be seen in a positive way, some students will seek attention through less positive ways, like acting out. Some students will withdraw. Neither of those behaviors are desirable. To head off management and engagement issues, it works well to provide students with lots of opportunities to feel seen, especially at the beginning of a learning experience. This activity is meant to be used at the beginning of any field experience, especially when it’s a new group of students, as a way for everyone to be seen and feel included as quickly as possible, both by you, and by other students, and to learn each others’ names. Addressing students by their name is also a way to help students feel seen. This game helps you (and other students) learn your students’ names asap, so you can use them throughout the field experience.

### Matter

**Matter is the “stuff” things are made of.** Wood is matter, bones are matter, water is matter, and even air is matter. Matter takes up space, but it’s hard to feel that with air unless you capture some in a balloon or bag. Matter also has mass (weight), but that’s also hard to feel with air, because it has so little mass. We live in a “sea of air,” so it can be difficult to feel the weight of air when you’re surrounded by it.

### Energy

**Energy is much harder to define than matter, and has different definitions depending on the branch of science.** In this context, energy can be defined simply as what organisms get from food that allows them to do things. If you’re introducing students to the term, “matter,” energy can also be partially defined as “not matter.” Unlike matter, energy doesn’t take up space or have mass. But if you want to go deeper...Energy has no physical form; it’s not a substance. When we say energy is transferred from one organism to another, we’re not talking about a physical thing being passed from place to place, rather we’re talking about transferring the capacity to do things, i.e. living and growing. Weird and confusing, huh? Want more? See the background section of the BEETLES activity *Food Build Do Waste*.

**Distinguishing between matter & energy.** A useful way to distinguish energy from matter is to say that energy flows and matter cycles. Since matter is the substance that all physical things are made of, we can track how matter cycles on Earth as it moves between living things, the atmosphere, the water cycle and in geological systems. Matter does not usually leave (or enter) the planet. The matter in Earths’ systems today is pretty much the same matter that has been cycling round and round throughout Earths’ history. However, a large amount of light and heat energy constantly flows into Earths’ systems from the Sun, and it just as constantly flows out of our system in the form of heat energy (or other forms of radiation). If energy didn’t flow out as much as it flows in, the Earth would accumulate energy and we would quickly become a

### TEACHING NOTES

### TEACHING NOTES

very hot planet. This is why it's not accurate to say that energy is "used up" by ecosystems, rather we should say it flows into and through them.

#### Food

It's useful for students to think of food as a package of matter and energy. Plants "package" energy and matter in food through photosynthesis. Plants use some of the food they make, and then consumers receive some of this matter and energy package as food is passed along the food chain. Food provides all consumers with chemical energy and matter needed to live and grow. Food needs to be digestible by the consumer to provide both matter & energy for the organism to live, build its body parts, do things, and grow. Organisms also need other kinds of matter to survive, such as water, oxygen, carbon dioxide, nutrients, and vitamins, but these substances are not considered food. Food serves both as a fuel to do things and also provides the molecules and building materials needed by organisms.

#### Common Student Misconceptions

**Misconception.** Energy from the Sun is captured by the Earth and keeps cycling round and round in ecosystems.

**More accurate information.** Eek! If that were true, Earth would be a very hot planet. *Matter* cycles through ecosystems here on Earth, and does not usually leave the planet (some air molecules are lost into space, and sometimes a spacecraft flies away). A large amount of energy flows to Earth from the Sun in the form of light energy, and is captured by plants and "packaged" with matter in the form of food. But at every link in a food chain or web, ~90% of the energy is lost from the system and eventually drifts into outer space as heat. ~10% is passed on to the next organism. There is a constant flow of energy from sunlight into an ecosystem (during the day), and a constant flow out of the ecosystem into space. Some environmental and science educators try to simplify the concepts of matter and energy into just being "energy," leading them to say that energy keeps cycling through Earth systems. This can be kind of confusing for students, since energy is a much more abstract concept for students to grasp than matter. By teaching kids that food is energy *and* matter, and that *matter cycles* and *energy flows*, we can give students a more accurate picture. If you're thinking of simplifying, it's better for students to first understand how matter cycles, and then later to be introduced to the concept of energy flow..

#### Common Instructor Misconceptions

**Misconception.** It's effective to "front-load" students with concepts.

**More accurate information.** A common mistake in instruction is to deliver content before students are interested in it. People learn best after they've become interested in a topic, and they've had a chance to explore and become curious about it. Learning without this sort of engagement can be rote learning, which isn't usually retained very well. We recommend *not* using this game as a way to begin telling students a bunch of

content about matter and energy right off the bat. This game is meant to be a way to get every student to have a chance to be “seen,” while learning each other’s names at the beginning of a field experience. The activity also *lightly* begins to introduce the topic of matter and energy in ecosystems, using a chant that an instructor can refer back to during the field experience. (“Organisms use matter from food to build their bodies. Remember the chant, ‘got matter to make it? That’s what that was referring to. And organisms use energy from food to do things, which was also in our chant as, ‘energy to shake it.’”)

## Activity Connections

An activity like this is mostly about learning students’ names and building some rapport. If your goal is to have students develop their understanding of concepts related to matter and energy or interdependent relationships in , you’ll need to do some activities related to that theme.

For information on planning a field experience of activities related to matter, energy, and interdependent relationships in ecosystems, see the resource *Ecosystems, Matter, and Energy Theme Hike*. For activities that will develop students’ understanding of matter and energy in ecosystems, use *Food Build Do Waste*. For activities that will help students develop understanding of interdependent relationships in ecosystems, try *Decomposition Mission*, *The Case of the Disappearing Log*.

## TEACHING NOTES



**This activity is a short Invitation to learning experiences focused on matter and energy in ecosystems.**

# FIELD CARD

Cut out along outer lines. This makes a handy reference card that will fit in your pocket.

 **You Are What You Eat**

**Name Game**

1. Take care of logistics for field experience first.
2. Gather students in a toe-to-toe circle.
3. Place paper with the following lyrics in the middle of the group:  
Your name is \_\_\_\_\_. You are what you eat.

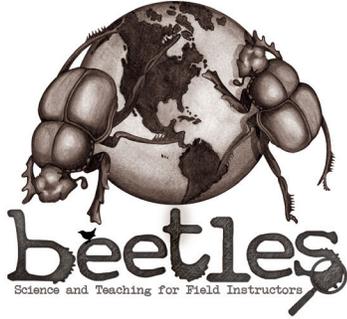
Got matter, to make it. Energy to shake it.  
Shake it \_\_\_\_\_! Shake it \_\_\_\_\_! Shake it \_\_\_\_\_!

4. Tell students they're going to do a name game in which they'll each have a chance to do a little dance.
5. Reassure them that it doesn't need to be anything fancy - just move your body.
6. Start clapping a moderate beat, choose a student to go first, tell them to say their name, & start the chanting.
7. Lead the chant & encouragement as first student dances during "shake it \_\_\_."
8. Do the same for the rest of the participants, including yourself & other adults.

**Wrap-up**

9. Explain the connection to the theme of Ecosystems, Matter & Energy.
10. Explain: Organisms get matter from food to "make," & energy to "shake" their bodies.
11. Explain: We'll be looking at how energy flows & matter cycles through the ecosystem.
12. Move on to your next activity. Suggested activity to immediately follow this are Mind Pie and/or Walk & Talk
13. Move on to the rest of your field experience..
14. Do other activities related to Ecosystems, Matter, and Energy.

© The Regents of the University of California. [beetlesproject.org](http://beetlesproject.org)



## ABOUT BEETLES™

**BEETLES™** (Better Environmental Education Teaching, Learning, and Expertise Sharing) is a program of The Lawrence Hall of Science at the University of California, Berkeley, that provides professional learning sessions, student activities, and supporting resources for outdoor science program leaders and their staff. The goal is to infuse outdoor science programs everywhere with research-based approaches and tools to science teaching and learning that help them continually improve their programs.

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

The Lawrence Hall of Science is the public science center of the University of California, Berkeley. [www.lawrencehallofscience.org](http://www.lawrencehallofscience.org)

*Principal Investigator and Articulate Beetle:* Craig Strang

*Project Director, Lead Curriculum & Professional Learning Developer, and Idea Beetle:* Kevin Beals

*Project Manager, Professional Learning & Curriculum Developer, and Beetle Herder:* Jemma Foreman

*Curriculum & Professional Learning Developer and Head Fireball:* Lynn Barakos

*Curriculum & Professional Learning Developer and Champion-Of-All-The-Things:* Emilie Lygren

*Research and Evaluation Team:* Bernadette Chi, Juna Snow, and Valeria Romero

*Collaborator, Super Naturalist, Chief Scalawag and Brother-from-Another-Mother:* John (Jack) Muir Laws

*Project Consultants:* Catherine Halversen, Mark Thomas, and Penny Sirota

*Advisory Board:* Nicole Ardoin, Kathy DiRanna, Bora Simmons, Kathryn Hayes, April Landale, John Muir Laws, Celeste Royer, Jack Shea (emeritus), Drew Talley, & Art Sussman.

*Editor:* Lincoln Bergman

*Designer:* Barbara Clinton

*The following programs have contributed to the development of these materials by field testing and providing invaluable feedback to the development team. For a complete list of contributors and additional partners, please see our website at [beetlesproject.org/about/partners/](http://beetlesproject.org/about/partners/)*

*California:* YMCA Camp Campbell, Rancho El Chorro Outdoor School, Blue Sky Meadow of Los Angeles County Outdoor Science School, YMCA Point Bonita, Walker Creek Ranch, Santa Cruz County Outdoor Science School, Foothill Horizons Outdoor School, Exploring New Horizons Outdoor Schools, Sierra Nevada Journey's School, San Joaquin Outdoor Education, YMCA Camp Arroyo, Shady Creek Outdoor School, San Mateo Outdoor Education, Walden West Outdoor School, Westminster Woods.

*Other locations:* Balarat Outdoor Education, CO; Barrier Island Environmental Education Center, SC; Chincoteague Bay Field Station, VA; Eagle Bluff Environmental Learning Center, MN; Great Smokey Mountain Institute at Tremont, TN; Wellfleet Bay Wildlife Sanctuary-Mass Audubon, MA; Mountain Trail Outdoor School, NC; NatureBridge, multiple locations; Nature's Classroom, multiple locations; North Cascade Institute Mountain School, WA; Northbay, MD; Outdoor Education Center at Camp Olympia, TX; The Ecology School, ME; UWSP Treehaven, WI; Wolf Ridge Environmental Learning Center, MN; YMCA Camp Mason Outdoor Center, NJ; and YMCA Erdman, HI.

*Photos:* Pages 1 and 2 by Kevin Beals. *Icons:* Backpack by Rémy Médard; Growth by Arthur Shlain; Cut by Nathan Thomson; Outside by Petr Holusa; Park by Antar Walker; & Time by Wayne Middleton all from The Noun Project.

**Funding from 2012-2015 for BEETLES publications such as this one has been generously provided by the S.D. Bechtel, Jr. Foundation, The Dean Witter Foundation, and the Mary A. Crocker Trust.**



© 2015 by The Regents of the University of California. All rights reserved. These materials may be reproduced, copied, and distributed in their entirety for non-commercial educational purposes, but may not be sold, rented, or otherwise distributed. Neither text nor illustrations may be modified, excerpted or republished into other material without the prior express written consent of the copyright holder. The existing trademark and copyright notices may not be removed or obscured.

To contact BEETLES™, email [beetles@berkeley.edu](mailto:beetles@berkeley.edu)