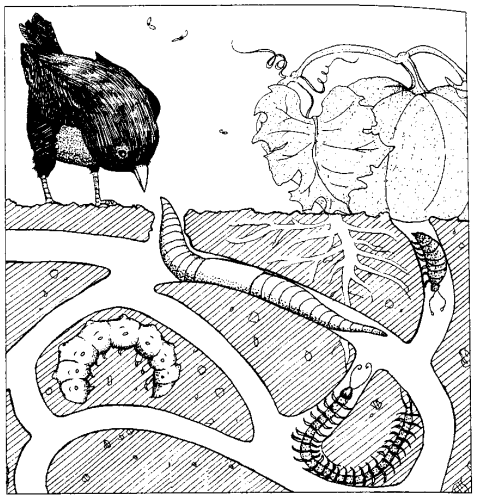
Compost Creatures and Friends[1]



Play Worm Bin Bingo and make a Worm Bin Field Guide

Recommended Grades: K–6

- **Science**
- **Language and Visual Arts**

Goals

Learn about the inhabitants of the compost ecosystem and appreciate what is involved in creating healthy soils. Students research, locate, and identify the inhabitants of the world of decomposition ("creepy crawlies").

Key Points

- There is more to a worm bin than meets the eye; the closer you look, the more you will see.
- Every critter in the worm bin plays an important role in the composting ecosystem.
- Believe it or not, the largest number of organisms in vermicompost are too small to see without a microscope! Billions of bacteria, fungi, and actinomycetes are an "invisible" workforce in soils and compost piles.

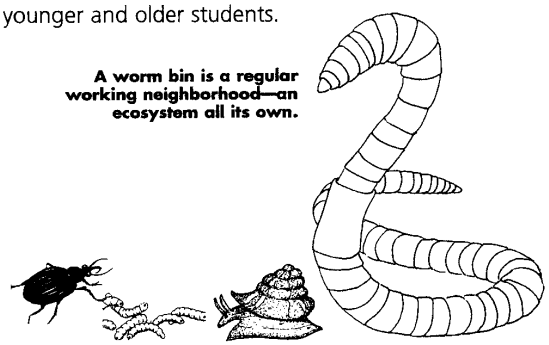
Background

They're not officially invited guests, but after two to four months, a variety of compost creatures can be found scurrying and crawling around in what you thought was solely a home for composting worms. This is usually good news; for the most part, the uninvited guests are toiling away for their room and board—and aiding the worms in breaking down some of the hardest stuff in the process.

[1] Worm Bin Bingo Game inspired by and adapted with permission from *The Microcosmos Curriculum Guide to Exploring Microbial Space,* edited by Douglas Zook, Kendall Hunt, 1994.

Who arrives in your bin will vary from bin to bin and how they get there seems like a bit of a mystery. However, bacteria and fungi are ever-present in our air, and foods contain organisms that naturally start the decaying process over time. If you added a handful of soil to the bin as recommended, it probably contained some eggs or larva of some of these unsolicited guests. Others may have just followed their noses, so to speak. The organisms you find in the bin can also be found in soils rich in organic matter and in outdoor compost piles. These creatures are basically decomposers or are the predators of decomposers!

While the other decomposer organisms may outnumber the earthworms in the bin, the worms are still essential. It is their digestion of organic material that creates the nutrient-rich worm castings that plants and gardeners love. *Note:* The activities in this lesson could be divided into projects for younger and older students.



A worm bin is a regular working neighborhood—an ecosystem all its own.

What You'll Need

For the Worm Bin Field Guide: books on soil and compost organisms; drawing paper; pencils; microscope if available (ask high school science teacher).
For Worm Bin Bingo: large plastic containers (recycled from home) or trays; magnifying lenses; copies of the Worm Bin Field Guide and Compost Creature Bingo Cards (see Getting Ready); worm compost, outdoor compost, or organic-rich soil.
Optional: prizes for bingo.

Teacher Tip

For younger students, just taking time to search for and identify compost inhabitants from illustrations is probably enough. For older students, this could take several class periods, depending on your goals.

Getting Ready

For the **Bingo Game**: Duplicate the Worm Bin Bingo Cards for handouts.
For the **Worm Bin Field Guide**: List living organisms the students have noticed in the worm bin so far—redworms, cocoons, etc. Add names of potential worm bin visitors from Meet Some Compost Creatures on page 167. Divide class into small groups and distribute worm bin inhabitant names evenly among the research groups. They are to create identification pages for the assigned organisms. (Be sure they include an illustration and four important facts for each organism.) When their research is complete, compile the pages together in a Worm Bin Field Guide. Make copies for each group if desired. This Field Guide will be helpful in the bingo game to follow. You may want to enlist a parent or older student helpers for these activities.

How to Do It

Begin by explaining the rules of the game.

- Groups work together finding compost organisms. (They can use the Worm Bin Field Guides made earlier for help.) Explain the rules/procedure. When they find a compost creature, they must identify it by name and record an observation about it—what it was doing, how it looked, where it was, etc. For each organism they identify and observe, they must receive verification from the teacher. If the teacher is satisfied with their description, and their observation, they can "X" out that organism's square on the bingo game or draw it in a blank square and "X" it out, and then start looking for another.
- A group gets "bingo" when four blocks, vertically, horizontally, or diagonally are "X"ed out.
- All searching must stop when the teacher gives a pre-determined signal—for additional instructions, to ask questions, or to share a special observation in the classroom.

Next, hand out bingo cards, trays with compost samples, magnifying lenses, and Worm Bin Field Guides, if available. Allow groups to start. Monitor success among the groups. Allow one sample swap of compost from the bin per team if locating creatures is slow.

Then, stop when either a certain amount of time has passed, or there's a bingo. Clean up.

Classroom Conversations

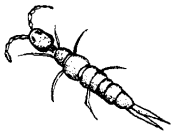
- Ask the groups to describe what they observed in the worm bin. Did each group find the same things? Discuss how these organisms got into the worm bin.
- Encourage students or groups to report any interesting behavior or sights during their investigations.
- Ask them if they played the game in a month or so from now, would anything be different?

Want to Do More?

- Dig into some leaf litter or an outdoor compost pile in search of the same compost creatures. Play the bingo game as you locate specific creatures. For indoor exploration, take a shovelful of soil from outdoors and place it on a white sheet to look for creatures.
- Have older students teach younger kids about compost creatures using the Worm Bin Field Guide they created.
- Write a story from the point of view of one of the organisms found in the compost.
- Arrange the organisms according to where they fit in the compost food web.

Meet Some Compost Creatures

With the exception of the centipede and spider, all the organisms listed below are decomposers. They help break down vegetable matter.



Springtails are numerous in nature and are impressive in how they hop. However, they are so tiny ($^1/_{16}$ of an inch—small enough to fit on the head of a pin) that their huge leaps don't look like much to us. Only if they appear in large numbers in the bin will their jumping draw some attention.

Spiders like dark places and they like to eat, so it's not uncommon to find one or two making themselves at home and dining on the tiny insect life living in your bin.

Sow bugs are related to pill bugs. They also have armored plates but do not roll up into a ball like the pill bug does.

Mites are related to ticks but most of the species in the bin are vegetarians. You may find them in large numbers on the surface, but you'll have to look closely. They have eight legs and are quite tiny.

Millipedes don't really have one thousand feet but some may have as many as one hundred. Fossils indicate they appeared on earth roughly 400 million years ago—long before dinosaurs walked the earth. Like pill bugs, they curl into balls when disturbed.

Pill bugs have ten pairs of legs, making them "isopods" and they have flattened plates that make them look like mini-armadillos. They roll up into a ball for protection.

Snails appear once in a while in a worm bin. They are quite delicate and tiny.

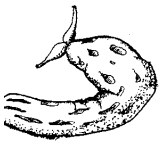
Fruit flies are not harmful but they do reproduce quickly! They are small but if you look closely, they are somewhat stout for their size (as compared to skinny fungus gnats, below).

Enchytraeids (en-kee-tray-ids), also called white worms or pot worms, can be confused with "baby worms." These tiny worms can appear in large numbers and are white.

Fungus gnats are often confused with fruit flies and can also appear around potted plants as they love soil, fungi, and tender plant roots. They are daintier looking, resembling tiny mosquitoes.

Centipedes are predators of the compost and they do eat earthworms, so you don't want too many of them, if any, in your worm bin! They have longer legs than millipedes.

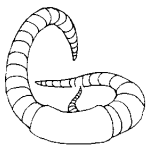
Redworms (wigglers) are found in compost piles, decaying manure or leaves, and worm bins. They are more slender than the garden-variety worms, have a reddish hue, and sometimes yellow stripes along their segments.



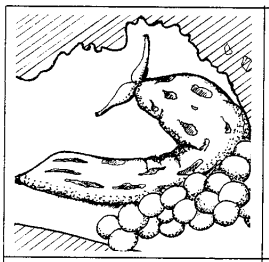
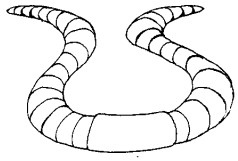
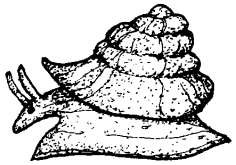
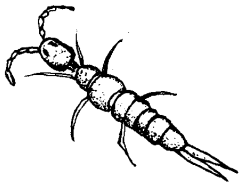
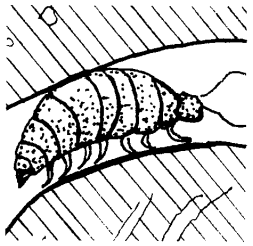
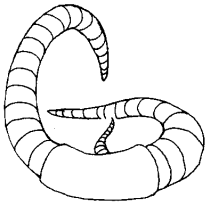
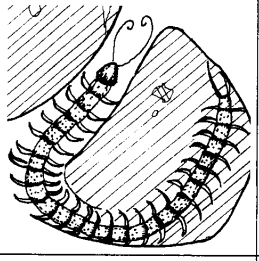
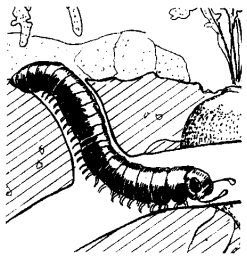
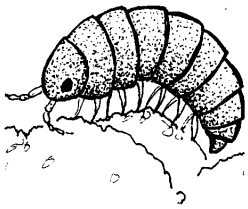
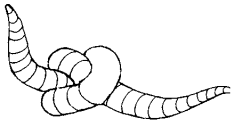
Slugs are basically snails without their shells—but they start out shell-less. If you look closely at a side, you might see their breathing hole.

Worm Cocoons (egg cases) are smaller than an apple seed, lemon-shaped, and vary in color from yellowish tan to dark brown. These cases hold two to ten worms!

Worm "Babies" are not to be confused with enchytraeids (pot or white worms), as they are small and whitish. They do have color, though, as you can see their insides (a red line) running from head to tail.



Worm Bin Bingo Card

	Draw What You Found		
	Draw What You Found		Draw What You Found
Draw What You Found			Draw What You Found
		Draw What You Found	

How to Play: Teams work together finding compost organisms. (You can use your Worm Bin Field Guides to help identify compost creatures.) When you find a compost creature, identify it by name and record an observation about it—what it was doing, how it looked, where it was, etc. For each organism you identify and observe you must get an okay from the teacher. If the teacher is satisfied with your description, and their observation, you can "X" out that organism's square on the bingo game or draw it in a blank square and "X" it out, then start looking for another. A team gets "bingo" when four blocks, vertically, horizontally, or diagonally are "X"ed out. All searching must stop when the teacher gives the signal.

From *Healthy Foods from Healthy Soils* by Elizabeth Patten and Kathy Lyons, illustrated by Helen Stevens, Tilbury House, Publishers.