



**Science Unit: *Discovering Life in Local Habitats***

**Lesson 9: *Worms***

School Year: 2010/2011

Developed for: McBride Elementary School, Vancouver School District

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Grade level: Presented to grades K and 1; appropriate for grades K – 7 with age appropriate modifications

Duration of lesson: 1 hour and 20 minutes

Notes: A related lesson plan which sets up a wormery: Lesson 2 of Scientist in Residence Unit on Soils, Plants and First Nations (ref 4).

**Objectives**

1. Investigate a familiar animal closely and learn about its anatomy.
2. Think about the needs of a living thing, and make a habitat to satisfy those needs.
3. Become familiar with a local composting effort, and understand the role of the living things involved in the system.

**Background Information**

Many schools have composting bins on their grounds, but students are often unfamiliar with how to use them and what they achieve. Through a worm study and making an indoor worm compost bin, students understand more fully what composting achieves, and may contribute more effectively to their school's composting program.

**Vocabulary**

worm an invertebrate animal (no bones) that lives in the soil, eats rotting plants, and makes rich soil

composting making a pile of plants that will rot, be eaten by worms and other living things, to make rich soil.

**Materials**

- worms, one per student. Red wigglers from a compost facility, or smaller earthworms dug from the earth, are suitable.
- small petri dishes containing a drop of water, one per student
- tub for indoor compost bin
- magnifiers, one per student
- newspaper
- water (either pond water, or water that has sat out overnight to allow the chlorine to dissipate)
- anatomy image of a worm
- vegetable scraps
- extra soil



## **In the Classroom**

### **Introductory Discussion**

a) Ask students about their experience of worms.

- Who has seen a worm before?
- Who has looked closely at a worm before? What did you notice?
- What do worms do? (They eat rotting plants and make the soil rich).

b) Introduce what we will do today.

- We will look closely at worms, then make a habitat for them.
- Their habitat is a compost bin. We will add vegetable scraps, which is food for the worms, and they will turn it into rich soil.

Other items to discuss or review:

- Worms are living animals, and need to be treated gently. Do not drop or tap the dish they are in, and release them from the dish within an hour.

Brief description of science activities.

- Close observation of worms
- Make a worm habitat aka indoor compost bin
- Visit the school/local outdoor compost bin

Processes of science that the students will focus on: close observation, care of animals.

### **Science Activities**

(1) Activity Title: Close observation of a worm

Purpose of Activity: Look at a familiar animal closely, and understand more about how it lives.

Methods and Instructions:

Set-up prior to experiment: for each student, a small petri dish containing a drop of water and a worm, with the lid sealed with tape.

Students work individually.

1. Each student is given a worm in a petri dish and a magnifier at their desks.
2. Students are asked to look closely at the worm. After a few minutes, students are asked what they noticed about the worm. Questions to prompt: What parts they see on it? (e.g. segments, black gut running down the center). Which is the head and which is the tail? How does it move? Does it have eyes? (no).
3. Students are given more time to look for features that they did not notice before, and to make a worm drawing labeled with the features.
4. Group discussion of what they noticed, and how the features relate to how the worm lives. Show an image of worm anatomy (ref 1).



## SCIENTIST IN RESIDENCE PROGRAM

### 5. Useful worm information:

- Worms have no bones - they are invertebrates.
- Their body is made up of segments.
- They have no eyes, but are sensitive to light, and move away from light, which will take them down into the soil, away from predators like birds.
- They do have a mouth at the very tip of their pointed head end.
- They do not have lungs like us, but breathe through their skin, taking oxygen from the water around them. So they must stay damp, but not in a pool of water.
- They have a heart (5 actually) and a brain.
- We can see their dark gut running the length of the worm, and the soil that is forming in it. Worm feces is rich soil!
- If you cut a worm in half, both halves will not live. Sometimes the front piece of a worm can live if it has the vital organs intact.

(2) Activity Title: Assembling a worm habitat/indoor compost bin

Purpose of Activity: Make a habitat for an animal to take care of its needs.

### Methods and Instructions:

Students work individually.

1. Start with a discussion of what worms need to stay alive: food, air, shelter. Worms are also useful to us as they eat old vegetable scraps from our food preparations, and excrete rich soil
2. At their tables, students tear up newspaper into squares approximately 5cm x 5cm. Then they bring their newspaper and worms (from activity 1) to the carpet.
3. Students sit in a circle around the empty worm compost bin. As each item is added, we discuss what it is for:
  - An adult adds wet balls of newspaper in a layer on the bottom of the bin. This is to make the whole environment damp for the worms. The newspaper will also gradually rot together with the plants.
  - An adult adds a layer of soil, for the worms to live in before they make their own.
  - The students each add some old vegetable scraps to the bin e.g. carrot peelings and tops, lettuce and spinach ends. Avoid fruit as it attracts fruit flies. Avoid very wet fruit and vegetables such as tomatoes and cucumber, as they make the bin too wet, and also grow mould before being eaten by the worms.
  - The students add their worms from activity 1.
  - The teacher adds a little more soil to cover the worms.
  - The students add a layer of torn newspaper. This holds the moisture in, and keeps insects out.
  - Put the compost bin in an area of the classroom that the students can observe, but out of direct sunlight. In a month or so, the worms will have eaten the rotting plants they have been fed, and excreted a layer of rich compost. The class can harvest compost from the bin and use it to fertilize indoor or outdoor plants.

For more information on setting up and maintaining an indoor compost bin, see refs 2 and 3, and the worm information sheet.



## SCIENTIST IN RESIDENCE PROGRAM

(3) Activity Title: Visit an outdoor compost bin

Purpose of Activity: To see an established compost bin, and to increase awareness of local composting efforts.

### Methods and Instructions:

1. Show the students the old vegetables at the top of the compost bin, and the dark soil at the bottom of the bin. The worms in the bin will probably not be visible, but the compost is open to the ground underneath so the worms come up from underneath to reach the rotting vegetables in the bin. There are also many other animals living in the compost, that will help to break down the plants put in it.
2. Discuss what to put in the outdoor compost bin: all the vegetables that we put in our indoor compost, plus all other fruits and vegetables (as it is outdoors it is unlikely to get too wet, and fruit flies are not a nuisance outside). Meat and cheese should not go in the compost, as they attract rats. Garbage such as plastic tubs and bags should not go in the compost as they will not decompose.

### **Closure Discussion**

Review what worms like to eat, and that we have made them an indoor habitat. Review that we need to take care of the worms by making sure they have food (but not too much) and are kept damp (but not too wet).

Review that this worm habitat also makes compost for us. We will be able to harvest the compost in a few weeks, and use it to put on indoor or outdoor plants. The worms make rich soil that fertilizes the plants.

### **References**

1. Worm images found by searching for images of “worm anatomy” online. For example there is an image of worm anatomy at <<http://organicwaste.com.au/wonderous-worms/>>.
2. <<http://www.cityfarmer.org/wormcomp61.html>> City Farmer website with worm composting information. Accessed May 26, 2011.
3. Appelhof, Mary. 1997. Worms Eat My Garbage. Flower Press.
4. <[http://www.scientistinresidence.ca/pdf/life-science/Soils,%20Plants,%20and%20First%20Nations/SRP\\_Soil,%20Plants%20and%20First%20Nations\\_Lesson%202%20WF.pdf](http://www.scientistinresidence.ca/pdf/life-science/Soils,%20Plants,%20and%20First%20Nations/SRP_Soil,%20Plants%20and%20First%20Nations_Lesson%202%20WF.pdf)> Scientist in Residence Program Lesson Unit: Soils, Plants and First Nations. Lesson 2 (Earthworms and making a wormery).

### **Extension of Lesson Plan**

1. The students could help take care of the school compost facility, with their knowledge of how it works, who is living in there, and what items should and should not go in a compost bin.
2. Worms are one part of a food web. An outdoor compost bin can be taken apart to find the other living things in it and/or students can brainstorm in the classroom the other living things that eat and are eaten by worms. Reference 3 shows the food web of a compost pile on page 97.

# Setting up an indoor worm compost bin

## *You need:*

A tub (any size, but you will be able to compost more with a larger one)

Newspaper

Worms - I use "red wigglers", available from [www.compostworms.ca](http://www.compostworms.ca)

Old vegetables and plant trimmings (old fruit is also OK, but breeds fruit flies faster than vegetables)

Water

## *To make your compost bin:*

1. Soak half sheets of newspaper in water and make balls. Make enough balls to cover the bottom of your compost bin. These keep the bottom of the bin moist and will slowly get eaten up by the worms.
2. Add a layer of worms in composted soil (make sure they are in enough soil to start that they won't dry out).
3. Add a layer of old vegetables, followed by a little more soil.
4. Sprinkle over with water until it is moist, but not soggy (the worms will drown if it is too wet and dry out if it is not wet enough).
5. Tear up newspaper into narrow strips or squares, and throw them on top like a blanket for the worms. This keeps the moisture in and keeps the fruit flies out.

## *Maintaining your compost bin:*

These are a lot of instructions, but worms are pretty hardy, and bounce right back even if the population starts dying. It's best to often check on the bin and get a feeling for the conditions, rather than sticking to a strict schedule.

## **Water**

Every few days to once every two weeks, depending on the season and air humidity. Check every few days that the soil in the bin is moist but not too wet. Push aside some of the dry newspaper blanket and feel the soil with your finger. It is similar to house plants - it should feel moist but not soggy. If it is a little dry, push back all the dry pieces of newspaper and sprinkle some water over the soil and old vegetable pieces. Do not over-water or other animals will take over (worm mites will kill the worms). You will need different amounts of water at different times of year - depending on how hot the room is and what the weather is like outside.

## **Food**

Feed the worms old vegetables about once or twice a week, depending on how much food you put in and how many worms you have. You can add fruit scraps too, but it is a major attractant for fruit flies.

When the layer of old vegetables is just rotten away, add more. Do not add more worm food before the old vegetables are gone, or it will start smelling bad. A healthy worm bin smells like soil (a fresh, outdoors, earthy smell). Be careful if you add tomatoes or cucumber or anything with a lot of water in it. They make the bin very wet, and can grow mould easily.

## **Blanket**

Add about once every two weeks to once a month.

Every two weeks give the worms a new newspaper blanket. Do it when you add some food. Rip up the old soggy newspaper blanket and leave in the bin. Add new food on top of this. The wet newspaper will rot with the vegetables and the worms eat it too. (The paper in the soil will help it stay light so that air can get down to the worms.) Then add a new blanket of torn-up newspaper pieces on top (see "to make your compost bin" above). The blanket stops the soil from drying out so fast, and keeps fruit flies out.

## *Harvesting your compost:*

Every couple of months (or longer if you want) you can harvest the compost and use it to fertilize your house plants. The compost is a rich soil that is actually worm poop! Here's how: Take off the top layers of dry newspaper pieces and vegetables that are not yet rotten. You can use these again. Separate the compost from the worms (look out for worm eggs! They are reddish/brown, shiny and about 1mm long). Keep the worms in some compost to start a new compost bin. Put the compost on your houseplants - they will love it.

When you take worms out to look at make sure you put them back before they dry out. Take out a new worm if you want to keep looking. Look out for big old worms, new little young worms and worm eggs.

Your worms will probably not be able to eat all your old vegetables. If you want to compost more, make a new worm bin, or set up a larger bin outside. (The outside bin can be run with earthworms - if you pile up vegetable scraps in a container with no bottom on the earth, the worms will find it and move in. The only maintenance is watering every month or so if it does not get rain water, and mixing it up every couple of months).

## *More information*

website: <http://www.cityfarmer.org/wormcomp61.html>

book: Worms eat my garbage by Mary Appelhof (Flower Press)