



**Science Unit: *Ecologists Grow a Garden***

**Lesson 4: *Blue Orchard Mason Bee***

School Year: 2012/2013

Developed for: David Lloyd George Elementary School, Vancouver School District

Developed by: Lea Elliott (scientist); Barb Hinson and Mai McHardy (teachers); Erika Wilson and Joyce Ycasas (student teachers)

Grade level: Presented to grades 4 and 5; appropriate for grades 2 – 7 with age appropriate modifications

Duration of lesson: 1 hour and 20 minutes (This lesson includes 2-3 additional visits to the mason bee nest boxes over 2-3 weeks)

Notes: Before this lesson plan: install two mason bee nest boxes, buy local Blue Orchard Mason Bee cocoons, Blue Orchard Mason Bees need to be released at the right time of year. In the lower mainland, mason bees emerge in **March or April**.

It is very beneficial to link this lesson with Lesson 3: Habitat Garden in the Scientist in Residence Program unit: Ecologists Grow a Garden.. In Lesson 3 the essential mason bee resources are placed in the garden: water, plants and mineral soil. It is ideal to complete activity 3 in Lesson 3 before beginning Lesson 4. The rest of the lesson can happen concurrently.

**Objectives**

- Learn about pollination and a local pollinator, the Blue Orchard Mason Bee.
- Explore the importance of habitat to the Blue Orchard Mason Bee by comparing two different mason bee nest sites.

**Background Information**

One of British Columbia's 400 native bee species is the Blue Orchard Mason Bee, a small, dark metallic blue insect. The bees are active in cool weather and earlier in the spring than honey bees. The mason bee is a great pollinator because pollen catches on a mason bees body hairs and moves to flowers more easily than honeybees. Animal pollinators are important to support successful school garden harvests, especially for fruiting plants, such as berries and fruit trees. Thirty-five percent of the worlds cultivated crops depend on wild or semi-wild pollinators. Mason bees prefer flowers with open petals and numerous small flowers clustered together: For example, apples, pears, plums, strawberries, kale, alyssum, crocuses and dandelions.

The Blue Orchard Mason Bee is a non-aggressive, solitary bee that can be encouraged to nest by installing a nest box full of cylindrical nest tubes. Nest boxes are installed facing east with a bit of sun, sheltered from the wind and rain. Mason bees begin mating and nesting in the early spring. In each tubular nest a female bee will lay 7 to 11 eggs. Each egg is placed on top of a mound of pollen and nectar to feed the larva as it develops over the summer. They are called mason bees because they place a wall of mud between each egg to separate it from its neighbour. By October larvae have pupated inside a cocoon and are mature. At this time cocoons can be removed from nest cells, cleaned and stored in the fridge until next spring if desired.

To be successful, mason bees need nest tubes of the right length and diameter, nest boxes placed in the right microclimate, mineral soil, flowers, water and mates.



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### Vocabulary

<u>Microclimate:</u>	Places where local organisms or geography make climate conditions unique in one specific area and different from the nearby area (i.e. moisture from a creek, north side of tree).
<u>Mason:</u>	A person who builds and works with mineral products (i.e. stone, tile, clay).
<u>Pollination:</u>	Move pollen from one flower to another flower, which fertilizes the flower, starting the production of a fruit.
<u>Community:</u>	All species living and interacting in a specific habitat.
<u>Site:</u>	The location of a structure or event.

### Materials

- 2 Mason bee nest boxes
- Mineral soil with dish
- Waterproof mason bee worksheet, pencils, clipboard and cushion
- Mason bee cocoons (can be purchased from [www.westcoastseeds.com](http://www.westcoastseeds.com) or some garden stores)

### In the Classroom

#### Introductory Discussion

1. Discuss what pollination is and why it is important:
  - Dependence of our food supply on pollinators. Thirty five percent of agricultural food crops are pollinated by wild or semi-wild pollinators.
  - For plants to produce fruit, like the apples and berries we eat, pollen needs to be carried from plant to plant. The more pollen brought to a flower the larger the fruit will be.
  - How can pollen travel? (wind, insects, birds, bats)
  - Watch pollination video: [Flower Pollination](#)
  - As we watch video think about: Why pollination is important? Name three animal pollinators.
2. Introduction to today's activities:
  - One pollinator is the bee. In BC there are 400 native species of bees. Bees visit flowers to collect nectar and pollen for food for themselves and their eggs. As they fly from flower to flower they, without even knowing it, take pollen from one flower and leave it on another. BC bees lay their eggs in the ground, in holes, in trees, plants or buildings. One type of bee we'll be studying and encouraging in our garden is the Blue Orchard Mason Bee.
  - Outside we will learn about mason bees and record site characteristics of mason bee nest boxes.
  - Review outside ethics and behaviour.

#### Science Activity/Experiment

Activity Title: Mason Bee Mystery

Purpose of Activity: To learn about mason bees



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### Methods and Instructions:

Set-up prior to experiment: Install nest boxes. Place one mason bee nest box in an ideal microclimate (in the sun facing, east) and place the other in a non-ideal microclimate (in the shade). Source mason bee cocoons, mineral soil and shallow dish to hold mineral soil.

1. Observe mason bee cocoons and place some at each nest box. Show photos of a mason bee and larva in a nest tube. Discuss resources mason bees need, how they nest and why they are great pollinators.
2. The males may emerge within thirty minutes. The females may take a few days. Females live about one month as they feed and lay eggs. Males die after mating.
3. Students record field observations: date, weather, location, site conditions, hypothesis (i.e. The nest box with more sun exposure will attract the most nesting mason bees). You can run this experiment as a 'mystery': which nest box will the mason bees choose?
4. Visit the mason bee nest box at least 2 more times. Each visit can be a week apart. Students should record field observations during each visit.

### Closure Discussion

1. Why are we encouraging mason bees at our school?
2. What resources do mason bees need?
3. Name a physical or behavioural mason bee adaptation.

### References

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3. Elliott, Lea. 2011. Blue Orchard Mason Bee Care. <http://naturehood.ca/pdfs/masonbeecaresheet.pdf> Accessed March 10, 2013.
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6. Apiculture Factsheet #506. Blue Orchard Mason Bee, *Osmia lignaria*. BC Ministry of Agriculture. [http://www.agf.gov.bc.ca/apiculture/factsheets/506\\_osmia.htm](http://www.agf.gov.bc.ca/apiculture/factsheets/506_osmia.htm) Accessed January 22, 2013
7. City Farmer. 2010. Mason Bees at City Farmer. Vancouver, BC. [http://www.youtube.com/watch?v=9pY9fVvc\\_X4](http://www.youtube.com/watch?v=9pY9fVvc_X4) Accessed March 10, 2013.
8. Lifecycles Project Society. Let Me Tell You 'Bout the Bees. Victoria, BC. [http://lifecyclesproject.ca/resources/downloads/let\\_me\\_tell\\_you\\_bout\\_the\\_bees.pdf](http://lifecyclesproject.ca/resources/downloads/let_me_tell_you_bout_the_bees.pdf) Accessed March 10, 2013.



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9. Missouri Department of Conservation. Flower Pollination.  
<http://www.youtube.com/watch?v=ge3EM8AERV0> Accessed March 10, 2013.

### **Extension of Lesson Plan**

1. Explore the Blue Orchard Mason Bee further in the classroom:
  - Watch [Mason Bees at City Farmer](#)
  - Draw the mason bee lifecycle.
2. Create Venn diagrams to compare mason bees and honey bees.



## Mason Bee Nest Box Observations

Name: \_\_\_\_\_

Hypothesis: \_\_\_\_\_

Date	Weather	Time	Observations (Describe the nest boxes. How many nest holes are filled?)
			<i>Shady Nest Box:</i>
			<i>Sunny Nest Box:</i>
			<i>Shady Nest Box:</i>
			<i>Sunny Nest Box:</i>
			<i>Shady Nest Box:</i>
			<i>Sunny Nest Box:</i>