Observing ladybugs offers opportunities to integrate language arts into a life cycle unit.

By Leslie Bradbury, Rachel Wilson, and Amy Lunceford

Let's Hear It for Ladybugs!

"I eat bugs. Do you like to eat bugs?"

"You and I are a little bit the same. We can both fly, and we can lay eggs."

These quotations are from letters written from ladybugs to butterflies at the conclusion of a unit exploring ladybug life cycles. As part of a larger garden project, we implemented a series of integrated lessons with second graders that fueled their excitement and culminated in the release of beneficial insects in our school garden. One of our goals for the unit was to have students connect life cycle concepts, which they had investigated previously with butterflies, to a new organism. Because of students' comfort level with these insects and their interesting life cycle, ladybugs seemed to be the perfect choice! We used a 5E format to structure our explorations (Bybee et al. 2006) and integrated several language arts activities to support our science inquiries. Using this approach seamlessly met both science content objectives and *Common Core State Standards* for English Language Arts in a way that captured and sustained students' attention. To prepare for this unit, we ordered ladybug larvae (see Internet Resources) and assembled materials for a habitat (see A Homemade Habitat, p. 65).

FIGURE 1.

Ladybug life cycle predictions.

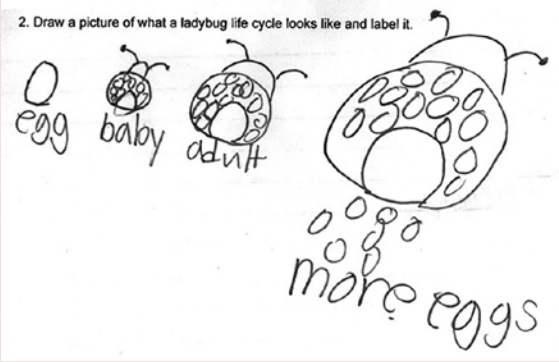
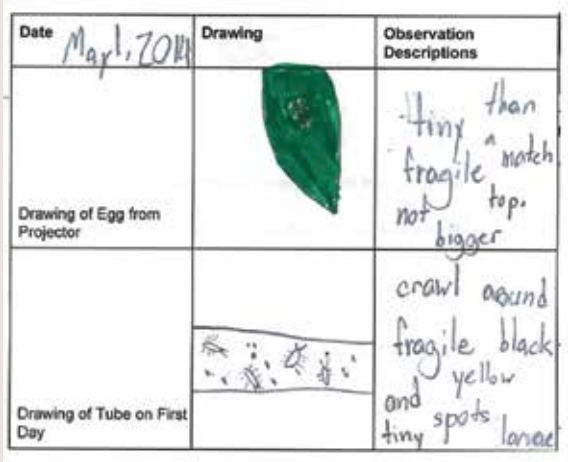


FIGURE 2.

Life cycle observations.



Engage

Our investigation started when we asked the second graders to place a set of photos of the butterfly life cycle in sequential order. These photos, along with others used in the lessons, were downloaded from Wikimedia Commons, a website that provides access to media files such as photos and videos that can be used for free (see Internet Resources). We began in this way to determine students' prior knowledge. The second graders had begun the school year with a unit on life cycles that included observing butterflies undergoing metamorphosis in the fall, but our ladybug lessons didn't occur until spring. We thought it was important to see what they remembered, and we hoped that by beginning with a familiar organism, students would be more prepared to predict what might happen with a new animal.

After students organized their butterfly photos, glued them in their science journals, and labeled the pictures, they predicted the stages in the life cycle of a ladybug using drawings and labels. Most students in the class drew an egg, followed by a "baby" ladybug, with an adult ladybug represented in the final stage (see Figure 1). Their "baby" ladybugs looked like miniature adults. Only one student in the class drew a life cycle that included a pupa stage. We were interested to see that the students held these conceptions about the life cycle since they seemed to have such a good understanding of the butterfly life cycle.

FIGURE 3.

Ladybug eggs.

Explore

Our lesson continued on the same day. This portion of the lesson began by sharing a photo of ladybug eggs on the document camera in the classroom. The second graders drew a picture of the eggs and recorded several descriptive words to support their drawings. The students wrote words like, "small, yellow, and round," to describe the eggs. One observant student stated that the eggs looked "like popcorn kernels." Students recorded these observations in a chart that they glued into their science journal to organize their data collection (see Figure 2). We chose to use a photo (Figure 3) during this section because we were not able to find a commercial source for ladybug eggs. Once their descriptions were completed, the students were ready for the "big event." We brought out a tube containing the ladybug larvae that students would be observing over the next two weeks and asked the students to identify the organisms. The second graders were shocked to learn that the creatures in the tube were the larvae of ladybugs (see Figure 4). Because all of the larvae for the investigation had been delivered in a single tube that included their food, we walked around the room with the tube so that all students could see, and then placed the tube on the document camera and zoomed in to enable students to include as much detail as possible in their drawings and written observations. It is important to note that we only left the tube on the camera for a short time (between 30 seconds and 1 minute). The lights from the document camera could cause the larvae to overheat and die, so after students made their initial observations, we resumed walking around the room with the tube. Using both drawings and words, the second graders then predicted what the larvae would look like in one week and in two weeks (see Figure 5). For their week 1 predictions, students were divided: Most students believed that the ladybugs would still be in the larva stage but be larger, while others expected that the larvae would have already transformed into an adult. All of the students predicted that they would see an adult ladybug in two weeks.

CAUTION

FIGURE 4.

Ladybug larvae.

FIGURE 5.

Predictions of how the larvae would look in two weeks.

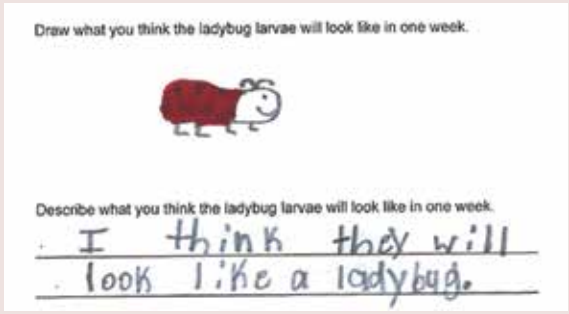


FIGURE 6.

Homemade ladybug habitat.

PHOTO COURTESY OF THE AUTHORS

FIGURE 7.

Observations and questions.

We then placed the larvae in a habitat so that the students could observe them over the upcoming weeks. The habitat was a plastic container that contained the food that had been shipped in the tube with the larvae, along with a water source and a place for the larvae to climb. We used empty toilet paper rolls for a climbing surface. While there are commercial kits available, the larvae successfully completed their transformation to adults in a habitat that we made from common objects (see Figure 6).

Each day over the next few weeks, when the students entered the classroom, they were excited to observe the ladybugs and see whether changes had occurred. Because we had one habitat for our ladybugs, we placed it on a table in the classroom and small groups of students took turns visiting the habitat to discuss what they were seeing and to record information about the ladybugs. The students had sections in their science journals where they included the date, a drawing, and a description of their observations. Additionally, they were asked to record any questions they had about the ladybugs (see Figure 7). Students' questions showed that they were interested in learning more about many aspects of ladybugs' lives. For example, the second graders wanted to know whether the ladybugs could swim, how high they could fly, and what bugs they could eat. Drawings over the next week showed that students saw the larvae for about five days, followed by the transition into the pupa stage.

Explain

After a week of observations where the students watched the transformation from larva to pupa, we used the nonfiction text *Ladybug* (Schwartz 1999), which contains close-up color photographs, to support the students' developing understandings of the ladybug life cycle. Each pair of students shared a copy of the book so that they could read along and see the pictures in detail as we read and lead a discussion about the book with the whole class. During the conversation, the second graders compared their own observations with the photographs from the book. We reinforced the idea that so far we had seen the egg, larva, and pupa stages of the life cycle. Additionally, we reviewed what the ladybugs had looked like in each one of those stages and what activities they had engaged in as larvae. We reminded students that if our ladybug larvae were living outside, they would be eating many aphids rather than the food provided by the ladybug suppliers. The students thought that it was very interesting that in nature, the ladybug larvae suck the juices from the bodies of the

FIGURE 8.

Model of the ladybug life cycle.

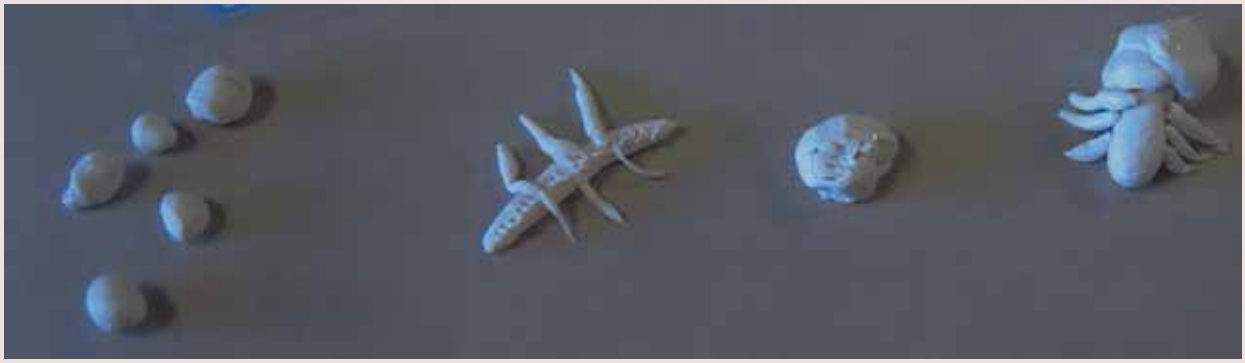


PHOTO COURTESY OF THE AUTHORS

aphids, and they were amazed to learn that one small ladybug larvae can eat hundreds of aphids.

Because the students had only observed as far as the pupa stage, we used plain white paper and binder clips to cover the pages that revealed what would happen next. Students were excited by the mystery that this generated, and begged us to let them see the covered pages. We explained that they would have to wait to find out the next steps using their own observations. The class discussed what they had seen already and whether any of their earlier questions had been answered. As the class generated new questions, we recorded them on chart paper for future investigation. At this stage, the second graders wanted to know, "How old do ladybugs get?" "Do ladybugs fight each other?" and "Are all ladybugs red?"

Elaborate

During the next week, the students continued with their observations of the ladybug pupa in their habitat. They were thrilled when the adult ladybugs began to appear about a week later. Once all of the adults had emerged, we read the final pages of *Ladybugs* (Schwartz 1999) and reiterated the stages of the ladybug life cycle including egg, larva, pupa, and adult. At this point in the lesson, we asked students to revisit the questions that we had generated as a class. We provided pairs of students with copies of the book *Ladybugs* (Gibbons 2012) and had them read it to determine whether they could answer any of their questions. For example, there is one section of the book that shows drawings of ladybugs from around the world including gray, yellow, and orange ladybugs. These opportunities for the second graders to engage with nonfiction texts for a genuine purpose and to answer their own questions using print resources provided a great opening to address *Common Core State Standards* in English Language Arts within the context of a science investigation (see Connecting to the *Common Core State Standards*, p. 66).

The next activity asked the second graders to build their own models of the life cycle of the ladybug using a pliable homemade dough (see Figure 8). We designed this portion of the lesson specifically to address the science practice of Developing and Using Models (see Connecting to the *Next Generation Science Standards*, p. 66). We gave each student an approximately ¾ cup chunk of the modeling material. The students then constructed

Ladybug Fun Facts

- Ladybugs are also known as lady beetles or ladybird beetles.
- Ladybugs are members of the beetle insect group who have hardened forewings which cover their delicate hind wings.
- During the winter, ladybugs hibernate in places such as rotting logs, under rocks, or in buildings.
- Ladybugs can protect themselves by playing dead or secreting a foul-tasting fluid from their leg joints.

Sources: *http://kids.nationalgeographic.com/content/kids/en_US/animals/ladybug* and *www.lostladybug.org*

their models of each phase of the life cycle. This part of the unit was especially successful as the second graders were intently focused on including detail in their models. When they began to have questions about specific characteristics of the phases, they referred to their drawings in their science journals and asked for the nonfiction books to double-check their accuracy. This step in the process was particularly exciting as the students were the ones who thought of going back to their journals and books to ensure their models were correct. We took photographs of each student's model and printed them to add to their journals.

Evaluate

One piece of our evaluation occurred once the ladybugs had reached the pupal stage. We asked the students again to draw the life cycle of the ladybug as they had done in the preassessment, and to predict how long it would take for the next stage to occur. This time there was not a single student who drew the egg, "baby," adult ladybug life cycle. Every student had drawn an egg followed by a larva. All of the students except for one included a pupal stage after the larva.

On the culminating day of the unit, we combined a writing activity with our ladybug release party. For the writing prompt, we asked the second graders to pretend that they were a ladybug writing a letter to their friend who was a butterfly. Their instructions were to explain to the butterfly how their lives were similar and different. Students were excited to share their science knowledge and their creativity in this assignment, with many students including aspects of a friendly letter along with their content. In this activity, students were able to combine information from their direct observations and their reading about ladybugs to produce a letter that showed what they had learned, addressing one of the Common Core writing standards (NGAC and CCSSO 2010). For example, one student wrote, "I start out as an egg just like you. I do not eat neckter or pollen. We both fly. We both have a shell when we are changing shape. Do you eat aphids? I do. When do you lay eggs?" Another student struggled a bit more with grammar and spelling but included scientifically accurate information. He wrote, "My life cycle is similer to yours. Mine is egg larva pupa adult. Yours is the same. We both got wings! Do you and me want to be frindes? Your frinde ladybug." The rubric used to evaluate these letters is available online (see NSTA Connection).

> The second graders were extremely enthusiastic throughout the ladybug activities.

Once the letters were complete, the second graders observed the adult ladybugs one final time. As a class, we discussed the needs of ladybugs and focused on the idea that the adults would not be able to stay in their habitats without the appropriate food or a place to lay their eggs. We also reinforced the idea that both ladybug larvae and adults feed on aphids and other insect pests. We revisited the book *Ladybugs* (Gibbons 2012), with an emphasis on the final pages that discuss the use of ladybugs to control crop pests. With this information in mind, the students decided that the school

garden would be the best home for the adults. Our group left the classroom and went out to the garden to release the adults, hoping they would lay their eggs in and around the garden when they were ready.

Conclusion

After reflecting on the experience, we feel that our goals for the unit were achieved. The second graders were extremely enthusiastic throughout the ladybug activities. They had multiple opportunities to use the science practices of Analyzing Data and Obtaining, Evaluating, and Communicating Information as they explored a topic that they found engaging (see Connecting to the *Next Generation Science Standards*, p. 66). The second graders were able to compare what they had learned about butterflies in the fall with a new insect, and their language arts skills were reinforced as they had the opportunity to read, write, and draw about science in a meaningful context. Let's hear it for ladybugs as an exciting organism for learning more about animal life cycles! ■

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A Homemade Habitat

Just like other living creatures ladybugs need food, water, and air in their habitat. Food for the ladybug larval stage is provided in the tube that comes with the ladybugs. It can simply be dumped into the bottom of the container. The food provided is sufficient to supply all of the ladybugs through their larval stage. The brown specks that are seen in the bottom of Figure 6 (p. 62) are the ladybug food. Water for the ladybugs should be provided on a damp sponge so that they don't drown trying to access it. Our ladybug habitat was kept at room temperature in the classroom. We included an empty toilet paper tube to provide a place for the ladybug larvae to climb, but they also climbed the side of the container.

The container that they are housed in should have air holes in the top. The ladybug larvae have soft bodies, so we did not have the children handle them. Instead, we chose a container with clear sides for easy viewing.

Acknowledgments

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NGSS Lead States. 2013. *Next Generation Science Standards: For states, by states.* Washington, DC: National Academies Press.

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Internet Resources

For teacher background on ladybugs:

National Geographic Kids: Ladybug
http://kids.nationalgeographic.com/content/kids/en_US/animals/ladybug

The Lost Ladybug Project
www.lostladybug.org

Wikipedia Commons
commons.wikimedia.org

Purchasing ladybugs and supplies:

We purchased our ladybug larvae from Insect Lore
www.insectlore.com

Plastic models of the ladybug life cycle are available through Carolina Biological Supply Company
www.carolina.com

SCILINKS
THE WORLD'S A CLICK AWAY

Keywords: Life cycles
www.scilinks.org
Enter code: SC150702

NSTA Connection

For the rubric, visit *www.nsta.org/sc1507*.

Connecting to the *Next Generation Science Standards* (NGSS Lead States 2013)

Please note that we conducted this unit in a second-grade classroom, but it is aligned with a third-grade performance expectation. Our state has not yet adopted *NGSS*, so we did these activities in the grade level that matched our state standard. However, the activities described would be appropriate for a third-grade classroom as well.

3-LS1-1 From Molecules to Organisms: Structures and Processes

www.nextgenscience.org/3ls1-molecules-organisms-structures-processes

Performance Expectation *The materials/lessons/activities outlined in this article are just one step toward reaching the performance expectation listed below. Additional supporting materials/lessons/activities will be required.*	**Connections to Classroom Activity**
3-LS1-1 Develop models to describe that organisms have unique and diverse life cycles but all have in common birth, growth, reproduction, and death.	Students construct a model of the ladybug life cycle that incorporates what they have learned through observing the process and reading non-fiction texts about the life cycle.
Science and Engineering Practices	
Developing and Using Models Analyzing and Interpreting Data Obtaining, Evaluating, and Communicating Information	Students • record observations of ladybugs and analyze the phases of their life cycle, • obtain relevant information about life cycles from nonfiction texts and compare that to their own observations, and • use the information from both sources to construct a physical model of the life cycle of a ladybug.
Disciplinary Core Idea	
LS1.B Growth and Development in Organisms • Reproduction is essential to the continued existence of every kind of organism. Plants and animals have unique and diverse life cycles.	Students compare the ladybug life cycle to the butterfly life cycle to identify similarities.
Crosscutting Concept	
Patterns	Students recognize that there is a predictable pattern that ladybugs go through in their progression from egg to adult by observing the process.

Connecting to *Common Core State Standards* (NGAC and CCSSO 2010)

English Language Arts

Reading Standards

CCSS.ELA-Literacy.RI.2.5: Know and use various text features (e.g., captions, bold print, subheadings, glossaries, indexes, electronic menus, icons) to locate key facts or information in a text efficiently

CCSS.ELA-Literacy.RI.2.7: Explain how specific images (e.g., a diagram showing how a machine works) contribute to and clarify a text

Writing Standards

CCSS.ELA-Writing.2.8 Recall information from experiences or gather information from provided written sources to answer a question